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Fortymile River

Placer Mining

Final Cumulative

ENVIRONMENTAL IMPACT STATEMENT

Department of the Interior
Bureau of Land Management
Alaska State Office
1988

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Errata

Section 4.1.6 - Cumulative Impacts

Correct acreage figures for total unreclaimed disturbance for topography are: Proposed Action - 1,590, Alternatives A and B - 1,540, Alternative C - 1,500, and Alternative D - 1,380 acres.

Section 4.4 Water Resources

Page 4-14 First full paragraph sentence should read:

> LaPerriere et al. (1985) have suggested that, due to the presence of elevated dissolved lead concentrations in the absence of settleable solids at one sampling site in the Chatanika River drainage. **Settleable solids** load reduction may not be sufficient to control heavy metal concentrations.

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ENVIRONMENTAL IMPACT STATEMENT
FORTYMILE RIVER

Draft Cumulative ( ) Final (XX)

ALASKA STATE OFFICE
ANCHORAGE, ALASKA

Lead Agency: U.S. Department of the Interior

Cooperating Agency: U.S. Army Corps of Engineers, Alaska District

Type of Action: Administrative (XX) Legislative ( )

ABSTRACT

This Final Environmental Impact Statement assesses the cumulative impacts of placer mining on the Fortymile River watershed as required by the U.S. District Court (District of Alaska) memorandum and order dated May 28, 1987, as amended, in Civil Case A86-083. A Proposed Action and four alternatives incorporating management options ranging from emphasizing regulation under 43 CFR 3809 to a "no mining" alternative as outlined by the Court are presented. The environmental consequences of all the alternatives are analyzed and presented.

For further information about this environmental impact statement, you may contact:

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United States Department of the Interior

BUREAU OF LAND MANAGEMENT
ALASKA STATE OFFICE
701 C STREET, BOX 13
ANCHORAGE, ALASKA 99513-0099

3809 (918)

Dear Reader:

Enclosed for your review is the Final Environmental Impact Statement (EIS) for the Fortymile River watershed. This EIS was prepared in response to a U.S. District Court (District of Alaska) Civil Case A86-083 filed on May 14, 1987, as amended, which required BLM to prepare an EIS for Birch Creek watershed, and the Fortymile River watershed, and required an evaluation of the need for an EIS on the Minto Flats and Beaver Creek watersheds.

A draft EIS was filed with the Environmental Protection Agency in June, 1988. The public was given 60 days to comment on the draft. Many hours of recorded oral comments and over 75 written comments were received before the end of the comment period. In the response to comments, we have supplemented and modified the analysis of environmental consequences and made factual corrections. The Proposed Action in the Final EIS adopts some of the performance standards analyzed for Alternative C in the Draft EIS. All comments on the Draft and the Final EISs will be considered in the decision making process.

I want to thank those of you who have provided suggestions and comments throughout this EIS process. Your help has been invaluable in the development and analysis of these alternatives.

Sincerely yours,

Mike Penfold

State Director

Summary

Introduction

Sandhill Crane

A United States District Court for the District of Alaska Memorandum and Order (A86-083 Civil) filed on May 14, 1987, instructed the Bureau of Land Management (BLM) to cease approving Plans of Operations for federal placer mines after October 1, 1987, in the Birch Creek watershed, pending completion of an adequate cumulative effects Environmental Impact Statement (EIS) and subsistence evaluation pursuant to Section 810(a) of the Alaska National Interest Lands Conservation Act. On May 28, 1987, additional injunctions followed covering the watersheds of Beaver Creek, the Fortymile River, and Minto Flats (which is comprised of the Chatanika River, Tolovana River, and Goldstream Creek). On July 22, 1987, the Court issued an amendment to the May 14 and May 28 orders, extending the date of cessation to November 15, 1987. The term "lawsuit" hereafter refers to the above orders and injunctions.

This EIS analyzes the cumulative impacts of placer mining on the Fortymile River watershed, as directed by the District Court in the lawsuit.

There are two primary objectives of this EIS. The first is to identify and consider performance standards under which placer mining may be conducted on federal lands in the area. The second is to comply with the Court Orders to conduct environmental evaluations and prepare the associated documents under the National Environmental Policy Act (NEPA) and subsistence requirements found in Section 810 of the Alaska National Interest Lands Conservation Act (ANILCA).

At issue are the cumulative impacts of multiple mining operations on the environment. Initially under these injunctions, only Plans of Operations on federal claims and long term camping associated with suction dredging were affected. Mines operating under Notices (operations disturbing five acres or less) were not affected; however, the impacts of such mines must be included in the evaluations. A subsequent Court Order of November 6, 1987, requires Plans of Operation for all operations regardless of size, on land withdrawn from mineral entry, with a one-year exception for those mines operating in 1987.

This EIS will be the overarching environmental document from which more site-specific environmental assessments can be tiered. Tiering is an interrelationship in which reference to a more general NEPA document such as this EIS can be made in a more specific one, thus avoiding duplication. A more specific environmental assessment will not change or modify decisions result-

ing from this analysis, but will, on a case-by-case basis, identify more detailed and site-specific actions and mitigation measures to reduce environmental impacts. The U.S. Army Corps of Engineers is a cooperating agency on this EIS and could also tier site-specific environmental assessments of proposed placer mining to this EIS.

An environmental assessment on long-term camping (EA No. AK-080-88-010) was completed on April 15, 1988 (DOI 1988c), to assess the existing situation under the lawsuit and recommend a course of action to meet the objectives of the Wild and Scenic Rivers Act (P.L. 94-199) as amended. BLM proposed to authorize long-term camping associated with suction dredge mining on State river bed claims within Scenic and Wild segments of the Fortymile National Wild and Scenic River Corridor. The Proposed Action and alternatives were discussed pursuant to the requirements of the National Environmental Policy Act of 1969 (42 USC 4231, et. seq.), as amended. Much of the information contained in the assessment is appropriate and is incorporated into this Environmental Impact Statement by reference.

The figure below illustrates some of the different guidelines and responsibilities of BLM, other federal agencies, and the State of Alaska in managing placer mining on the public lands.

Agency	Legal Guidelines & Plans for Management	Responsibility of Agency	Enforcement Responsibility of Agency
BLM	Management Framework Plan Section 302/310 FLPMA	Surface management	Prevent unnecessary or undue degradation. Promulgate rules and regulations.
EPA	Section 401 of Clean Water Act	Water quality	Water standards
Corps	Clean Water Act	Fill materials in waters and wetlands	Terms and conditions of DA permits
State of Alaska	AS 16.10.840 AS 16.05.870 AS 46 and 18 AAC 30, 31, 50, 60, 62, 64, 70-72, 75, 80	Fish passage Anadromous fish Air, land and water quality	State Standards

General responsibilities of applicable agencies concerning placer mining. This table applies to State, Federal and private mines. BLM evaluated the cumulative impacts of all mines, but can only manage within its jurisidiction.

BLM manages mining under the General Mining Law of 1872, 30 U.S.C. 22 et seq., as amended, and the Federal Land Policy and Management Act (FLPMA) of 1976, 43 U.S.C. 1701 et seq. The 1872 Mining Law provides for the exploration, development, production, and purchase of mineral resources of the public lands, as well as the implied right of access to mining claims.

BLM manages the long-term camps under provisions of the Wild and Scenic Rivers Act, and the Fortymile National Wild and Scenic River Management Plan (DOI 1983) and authorizes the use under Section 302(b) of the Federal Land Policy and Management Act of 1976 (43 USC 1732, 1740) set forth in 43 CFR 2920.2-2.

The Fortymile River drainage is located approximately 120 miles southeast of Fairbanks and encompasses nearly 4 million acres of land. A map entitled "Area Map" depicting major features, one entitled "Status" showing land status, and the "Tributaries and Main Physical Features Map" can be found in Chapter One.

As required by NEPA regulations, BLM used an open process to gather public input. To this end, a Notice of Intent to prepare environmental impact statements was published in the Federal Register on August 18, 1987, and in local newspapers in late August 1987. BLM also conducted a series of public scoping meetings in locations throughout the affected area between July and September 1987. At the same time, more than 450 notices of the public meetings were sent out to miners, environmentalists, native groups, and other members of the public.

The BLM also invited participation from other government agencies, private organizations, the placer mining industry, and any other concerned individuals. At the scoping meetings a description of the EIS process and the proposed activity was provided by the appropriate BLM District Managers. The meetings were then opened to members of the public to voice their concerns and ask any questions about the issues.

Significant issues include:

- What are the impacts of placer mining operations on water quality?
- How are water quality standards regulated and enforced, and who performs this function?
- What are the impacts of placer mining on terrestrial and aquatic habitats?
- Have reclamation practices and management under the 43 CFR 3809 regulations improved since 1981?
- What are the impacts of other agency laws and regulations on the placer mining industry?
- What are the impacts of placer mining on subsistence activities ongoing in the region?

Specific coordination meetings were held with various State of Alaska agencies including the Department of Natural Resources, Department of Environmental Conservation (ADEC), Department of Fish and Game, and the Office of Management and Budget, Office of the Governor. Meetings were also held with the following federal agencies: Environmental Protection Agency (EPA), Army Corps of Engineers (Corps), National Park Service (NPS), U.S. Bureau of Mines (BOM) and U.S. Fish and Wildlife Service (USFWS).

A Notice of Availability was published in the Federal Register on June 8, 1988 (53 FR 16590) for the Fortymile River Draft EIS. Over 800 copies of the Draft EIS were distributed to agencies, groups, and individuals on the mailing list. A total of three public meetings were held in conjunction with this EIS in Anchorage, Fairbanks, and Chicken. All discussion from these meetings and

hearings were electronically recorded. The Draft EIS was available for review and public comment from June 13 to August 12, 1988. This allowed the minimum required 45-day period for public comments.

During the comment period, 78 written comments were received in response to the Draft EIS from various government agencies, including the State of Alaska Governor's Office, private corporations, special interest groups, and members of the public. All comments (both oral and written) were considered during our review according to the requirements found in 43 CFR 1503.4(b). Some comments required a clarification of the information in the Draft EIS and that information is presented in the response to the comments. A matrix of commenters and the issues they raised is provided in Figures 5-1 and 5-2.

Summary of Alternatives and Environmental Consequences

Under all of the land management alternatives described in this EIS, BLM would manage lands under its authority to meet requirements found at 43 CFR 3809 (surface management regulations). Under each alternative the Corps would regulate the placement of dredged and/or fill material into waters of the United States, including wetlands (33 CFR 320 et seq.). The descriptions for each alternative will evaluate the cumulative impacts under various administrative conditions and requirements of not only the BLM but also those of the State of Alaska, EPA, and the Corps.

The following discussion summarizes the environmental consequences of the alternatives on the human environment. Please consult the appropriate sections of the EIS for additional information and background.

Proposed Action

The Proposed Action for this EIS is to manage mining claims on federal lands using existing water quality standards as managed by the appropriate agency, with enhanced reclamation standards. Reclamation activities would reshape tailings to approximate the surrounding physiography and spread the overburden and available topsoil over the reshaped tailings. If available topsoil is insufficient for adequate revegetation, then settling pond fines may be used in the reclamation effort. The diverted stream reaches would be restored to approximate its premining characteristics including configuration, gradient, and flow velocity unless the operators can demonstrate to the Authorized Officer (AO) that the bypass or another configuration is more appropriate. Seeding and/or fertilizing may be required to accelerate natural revegetation. Reclamation on State and private claims would be as specified in Appendix B-4.

The water quality performance standards would be the current EPA effluent limitation guidelines and ADEC water quality standards, or the existing EPA variance for the operation. The performance standards are 0.2 ml/l of settleable solids, .05 mg/l arsenic, and 5 Nephelometric Turbidity Units (NTU) above natural conditions when natural turbidity is 50 NTU or less, and not more than

a 10% increase in the turbidity when the natural turbidity is more than 50 NTU, not to exceed a maximum increase of 25 NTU at the mine effluent discharge point. These water quality standards would apply to federal, State, and private operations.

BLM would continue to manage long-term camps associated with suction dredging as proposed in the environmental assessment on long-term camping (DOI 1988c) to meet the objectives of the Wild and Scenic Rivers Act and provisions of the Fortymile National Wild and Scenic River Management Plan (DOI 1983). Suction dredging would be managed by the State of Alaska (with BLM acting as a cooperating agency.)

Consequences

Under the Proposed Action, BLM reasonably forecasts for purposes of analysis that a total of 40 mines (23 federal and 17 State and private mines) would be operating continuously for the next ten years in the Fortymile River watershed (primarily in the Mosquito-South Fork, Wade and Canyon Creek drainages).

There should be no major cumulative impacts on topography of public, State, and private lands. There would be some short- term modification of site aspect during mining which would not significantly impact the overall topographic setting of the affected area, since the required reclamation would include reconfiguration and stabilization. State and private lands would have some additional impacts on the topography since topsoil is not required to be respread over the reshaped site.

There should be no significant impacts on the availability of resources for mineral resource development.

Record nugget produced from early mining activity. From the "Toni" Troseth collection, courtesy of the Alaska and Polar Regions Department Archives, University of Alaska, Fairbanks.

The soil profile would be completely altered by mining operations on approximately 920 acres. Soil conditions may be impacted by access roads and trails through direct disturbance of the soil profile, enhanced erosion, or from compaction.

The impact of placer mining from federal non-point sources would result in some contribution to the sediment load of the stream system. However, this analysis indicates, with the possible exception of surface flow from large storms, that the downstream effect from non-point sources would be indistinguishable from expected natural conditions. Turbidity from non-point sources would

probably continue under all mining alternatives, however, increases should be minimal with enforcement of EPA and ADEC water quality standards. Settleable and suspended sediments from effluent discharges (point sources) should also be minimal under the revised EPA effluent limitation guidelines. Up to 46 miles of stream channel may be mined and reclaimed.

The vegetation cover would be destroyed in mine and road areas. A short-term loss of productivity is unavoidable. Two hundred thirteen acres would regrow to a riparian tall shrub community within 25-30 years of reclamation, with an additional 325 acres of regrowth within 50 years on mining disturbance in creek bottoms. Five hundred forty acres of new mining disturbance would remain barren or sparsely vegetated.

There are no "listed" threatened or endangered plant species within the watershed; however, there are three "candidate" threatened or endangered species and three endemic species. The effects of mining and associated activities on these species are unknown.

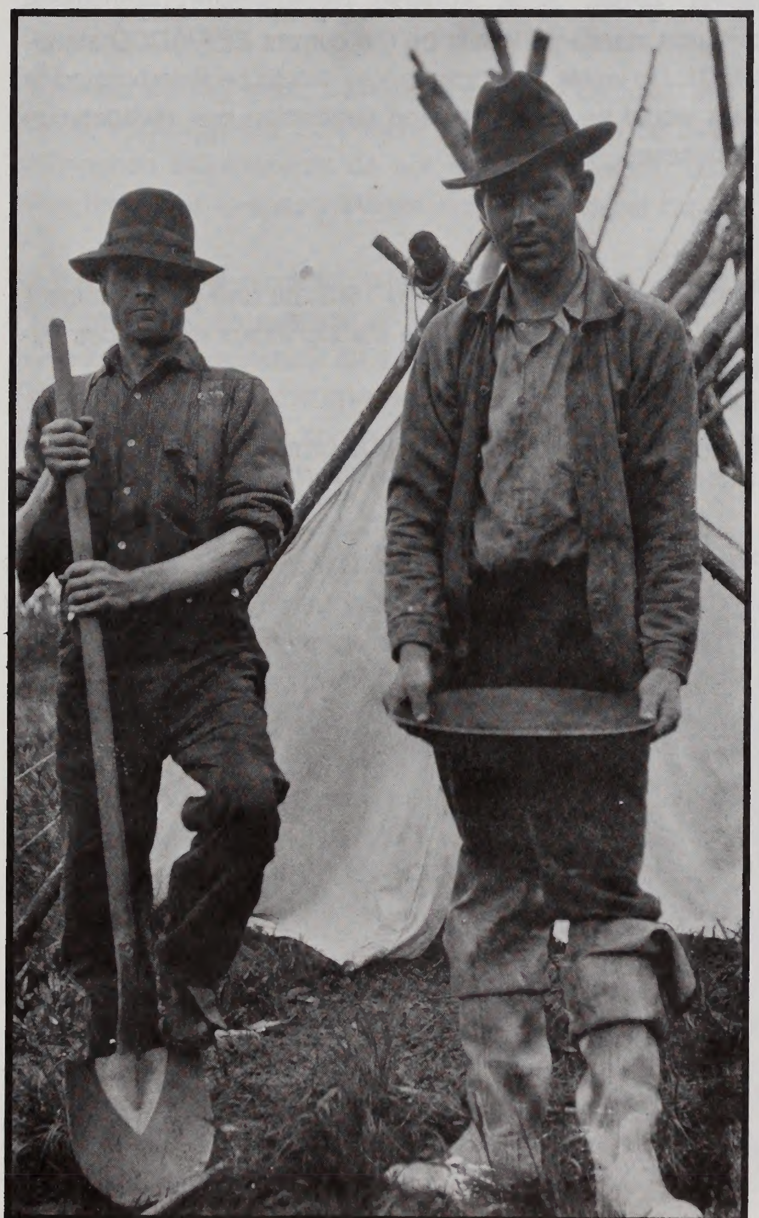
Approximately 3,329 acres of wildlife habitat would be physically altered due to mining-related activities. Periodic disturbances to wildlife due to the operation of vehicles and machinery, and human habitation affecting 227,044 acres could result in a low to moderate level of short-term cumulative effects. The principal long-term adverse effect of mining would be the unavoidable loss of approximately 920 acres of upland riparian habitat in the Wade Creek and Walker Fork drainages, the vicinity of Chicken, and other areas for a 25 to 30-year period. The long-term cumulative loss of habitat to federal (310 acres) and State and private (230 acres) mining activities in these areas would probably contribute to a low to moderate reduction in moose population potential. The potential exists for long-term cumulative adverse effects to wildlife if mining activity, suction dredging disturbances, and human use of the area increases greatly in crucial wildlife habitats.

There are two to five known peregrine falcon breeding pairs in the watershed. Various levels of protective measures would be required for any mining activity planned within 1 to 15 miles of these nests. No anticipated activities are within the boundaries set by the protective measures.

Physical alteration of streams and minimal increases in suspended sediments from mines would result in an unknown magnitude of impact on population levels of aquatic resources. Fish passage would be provided as required by the ADF&G. On federal claims, remining and reclamation of stream channels in old tailings would include rebuilding the stream channels and restoration of fish habitat. Approximately 46 total miles (26 federal, 20 State/private) of physical disturbance to streams would occur over the next 10 years. Stream-side habitat would be restored in 25-30 years through regrowth of riparian vegetation. The condition of fishery resources would remain similar to 1987 levels.

Cumulative impacts on cultural resources in the Fortymile River drainage do not appear to be significant.

Present village-based subsistence usage of the Fortymile River drainage is relatively limited, with Chicken the only community located within the area. While some subsistence hunting and trapping is done in the region, particularly along areas with roads, subsistence fishing appears to be virtually absent. This is because people from the Eagle, Northway, and Dot Lake areas utilize fish resources closer to their villages in the Yukon and Tanana River drainages. People from Chicken, in contrast, have a largely non-subsistence lifestyle, with most residents involved in mining. Food supplies are largely bought commercially and brought in via the Taylor Highway. Thus, while the cumulative effects of placer gold mining within the Fortymile River system have reduced the amount of habitat available for use by resident fish, the actual impact on subsistence usage has been minimal since utilization of these resources has not been particularly significant for much of the 20th century. Mining as it would occur under any of the alternatives, including the Proposed Action, would not be significantly disruptive to actual recent low subsistence usage levels in the drainage. Further, "mining at current levels and as currently practiced [in 1987] has little influence on physical water parameters in the basin" (Dames and Moore 1988). Thus, there is no evidence that the cumulative effect of mining in the Fortymile drainage would cause a significant negative impact on water quality as related to subsistence.



Alaska placer miners circa 1928 or 1929. Photo courtesy of the Anchorage Museum of History and Art.

Some motorized recreation activities would be enhanced by the 150% increase in road mileage over the next 10 years. However, trails available to small ORVs would decline by 19%. Floatboating use would probably remain at approximately the same level as in 1987 or increase as a function of an expanding State population and tourism.

Increased mining would increase the visual contrast with the natural landscape. Over a 10-year period, approximately 26% more acreage would be newly disturbed by mining activity. Reclamation would reduce visual impacts over the long-term.

As the number of operating mines increases to 40, direct mining employment would increase over

1987 levels by an average of 28 workers, while over a 10-year period direct earnings would increase by approximately \$7.3 million and output would increase by approximately \$15.5 million. Total employment in the greater Fairbanks area would increase by 41 workers, earnings would increase by \$10.9 million, and output would increase by \$26.3 million. Local rural population within the Fortymile River drainage would increase by about 40 people.

Annual costs for water treatment and reclamation for all federal mining operations would be \$43,700 and \$78,200 respectively. Administration and enforcement of the surface management program for placer mining would cost BLM about \$59,800 annually (all values in 1987 dollars).

Alternative A

This alternative would regulate mining under BLM surface management regulations (43 CFR 3809). The water quality performance standards would be the current EPA/ADEC standard of 0.2 ml/l of settleable solids and 5 NTU. No water quality variances would be incorporated in this alternative. Soils and stream channels would be stabilized, and restoration and revegetation would be allowed to proceed by natural processes.

Consequences

The effects of Alternative A are based on 35 mines (20 federal and 15 State and private mines) which would operate for the next ten years. The following discusses the significant differences between this alternative and the Proposed Action.

The soil profile would be completely altered by mining operations on approximately 805 acres of ground.

Water quality would improve over the Proposed Action due to standards with no variances to the 5 NTU turbidity and the .2 ml/l settleable solids standards. There may be slight increases from non-point sedimentation due to less effective revegetation. Forty miles of stream channel are estimated for mining and stabilization into bypasses.

The vegetation cover would be destroyed in the areas of the mines and roads. A short-term loss of productivity would be unavoidable. One hundred acres would regrow to a riparian tall shrub community within 30 years of reclamation, and an additional 218 acres would regrow within 50 years on mining disturbance in creek bottoms. Six hundred forty-four acres of new mining disturbance would remain barren or sparsely vegetated.

Approximately 3,073 acres of wildlife habitat would be physically altered due to mining-related activities. Periodic disturbances to wildlife due to the operation of vehicles and machinery, and human habitation affecting 209,068 acres could result in a low to moderate level of short-term cumulative effects. The principal long-term adverse effect of mining would be the unavoidable loss of approximately 805 acres of upland riparian habitats in the Wade Creek and Walker Fork drainages, the vicinity of Chicken, and other areas for a 30 to 50-year period. The long-term

cumulative loss of habitat to federal (368 acres) and State and private (276 acres) mining activities in these areas would probably contribute to a low to moderate reduction in moose population potential.

Impacts to invertebrate and fish populations from sediments would be somewhat less than under the Proposed Action due to no water quality variances. Long-term impacts to fish habitat from altered stream channels would be greater since this alternative requires bypass stabilization, but not restoration of the stream channel. Forty miles of stream channel are estimated for mining by 1998 under this alternative.

Some motorized recreation activities would be enhanced by the 108% increase in road mileage over the next 10 years. However, trails available to small ORVs would decline by 30%. Floatboating use would increase slightly compared to 1987 levels.

Increased mining would increase the visual contrast with the natural landscape. Over a 10-year period, approximately 32% more acreage would be newly disturbed by mining activity. Because reclamation requirements do not require reshaping tailings to resemble natural topography, or other measures to speed revegetation, many visual impacts would persist over the long-term.

As the number of operating mines increases to 35, direct mining employment would increase over 1987 levels by an average of 8 workers, while over a 10-year period direct earnings would increase by approximately $2.2 million and output would increase by approximately $4.5 million. Total employment in the greater Fairbanks area would increase by 12 workers, earnings would increase by $3.3 million, and output would increase by $7.7 million. Local rural population within the Fortymile River drainage would increase by about 10 people.

Typical mining operation showing river tailings. Bureau of Land Management.

Annual costs for water treatment and reclamation for all federal mining operations would be $362,000 and $20,000 respectively. Administration and enforcement of the surface management program for placer mining would cost BLM about $28,000 annually (all values in 1987 dollars).

Alternative B

This alternative would combine the standards from 43 CFR 3809 with standards established to meet the management goals of the River Management Plan for the watershed.

Water quality performance standards would be defined by current EPA/ADEC regulations as 0.2 ml/l settleable solids and 5 NTU turbidity when measured at the mine discharge point. Soils and stream channels would be stabilized during mining. After cessation of mining, overburden and topsoil would be spread over reshaped tailings. Revegetation would proceed naturally.

Consequences

The effects of this alternative are based on 35 mines (20 federal and 15 State and private) which would operate continuously for the next ten years. The effects are the same as the Proposed Action except for the following differences.

Impacts on water quality would be similar to those under Alternative A with the exception of more effective revegetation and slightly less non-point source sedimentation.

One hundred eighty-six acres would regrow to a riparian tall shrub community within 30 years of reclamation, with an additional 218 acres of regrowth within 50 years in mining disturbances in creek bottoms. Five hundred fifty-eight acres of new mining disturbance would remain barren or sparsely vegetated.

The long-term cumulative loss of habitat to federal (319 acres) and State and private (276 acres) mining activities in these areas would probably contribute to a low to moderate reduction in moose population potential.

Impacts to fish and invertebrate populations would be similar to those under Alternative A.

Under Alternative B, impacts to recreation would be identical to Alternative A, because impacts on road and trail mileage and on water quality would be identical.

Although Alternative B would disturb the same acreage as Alternative A, over the long-term visual impacts would be less because of the beneficial effect of more stringent reclamation requirements.

Economic impacts would be the same as with Alternative A.

Annual costs for water treatment and reclamation for all federal mining operations would be $362,000 and $44,000 respectively. Administration and enforcement of the surface management program for placer mining would cost BLM $37,400 annually (all values in 1987 dollars).

Alternative C

This alternative would focus on various standards or procedures proposed or under discussion by the EPA and other agencies. The water quality performance standards for this alternative would be zero ml/l settleable solids and zero NTU turbidity above natural conditions. Reclamation standards would emphasize restoration of natural appearing contours, creek channels, and native vegetation. Mining activities would be conducted to minimize impacts to wetlands and riparian zones. Alternative C is the environmentally preferred alternative.

Consequences

The effects of Alternative C are based on 30 mines (18 federal and 12 State and private mines) operating for the next ten years. The following discusses the significant differences between this alternative and the other alternatives and the Proposed Action.

There should be no significant cumulative impacts on topography or mineral resources. The soil profile would be completely altered by mining operations on approximately 690 acres.

Impacts to water quality would be less than the Proposed Action due to no variances, and the enhanced reclamation standards being applies to all upland operations in the watershed. Thirty-five miles of stream reaches are estimated for mining and reclamation by 1998.

One hundred sixty acres of disturbed ground would regrow to a riparian tall shrub community within 25-30 years of reclamation, with an additional 270 acres of regrowth within 50 years on mining disturbance in creek bottoms. Approximately 400 acres of new mining disturbance would remain barren or sparsely vegetated.

Approximately 2,805 acres of wildlife habitat would be physically altered due to mining-related activities. Periodic disturbances to wildlife due to the operation of vehicles and machinery, and human habitation affecting 172,002 acres could result in a low to moderate level of short-term cumulative effects. The principal long-term adverse effect of mining would be the unavoidable loss of approximately 690 acres of the moose winter range habitat in the Wade Creek and Walker Fork drainages, the vicinity of Chicken, and other areas for a 30 to 50-year period. The long-term cumulative loss of habitat to federal (243 acres) and State and private (162 acres) mining activities in these areas would probably contribute to a low to moderate reduction in moose population potential.

Impacts to fish and invertebrate populations will be less than under the Proposed Action. Sediment in the water column would be reduced, thus improving habitat. Reclamation of all stream channels after mining, and restoration of fish habitat will improve conditions over the long-term.

Some motorized recreation activities would be enhanced by the 75% increase in road mileage over the next 10 years. However, trails available to small ORVs would decline by 34%. Floatboating and associated uses would increase slightly compared to 1987 levels.

Increased mining would increase the visual contrast with the natural landscape. Over a 10-year period, approximately, 24% more acreage would be newly disturbed by mining activity. Reclamation would reduce visual impacts over the long-term.

As the number of operating mines decreases to 30, direct mining employment would decrease over 1987 levels by an average of 9 workers, while over a 10-year period direct earnings would decrease by approximately $2 million and output would decrease by approximately $1.4 million. Total employment in the greater Fairbanks area would decrease by 10-15 workers, earnings would decrease by $3 million, and output would decrease by $7.9 million. Local rural population within the Fortymile River drainage would decrease by about five people.

Annual costs for water treatment and reclamation for all federal mining operations would be $541,800 and $61,200 respectively. Administration and enforcement of the surface management program for placer mining would cost the BLM $39,000 annually (all values in 1987 dollars).

Alternative D

This is the "no mining" alternative defined by the District Court in its Memorandum and Order of May 28, 1987, as amended. Under this alternative, no applications for mining on federal claims, under either Plans of Operations or Notices or long-term camping permits, would be processed or approved by the BLM. Validity examinations would be conducted for each properly recorded federal mining claim, and the owner would be compensated accordingly. Stabilization of surface disturbance which has occurred since January 1, 1981 would be required on all federal claims, and restoration would be allowed to proceed by natural processes.

Alternative D violates current regulations (43 CFR 2091.1 for accepting applications and 43 CFR 3809.1-6 for processing applications) and would therefore require changes in the regulations for legal implementation. This alternative would also require change in statutory law in order to authorize any takings as well as appropriations to pay for the same.

Consequences

The effects of Alternative D are based on 17 State and private mines operating for the next ten years. There would be no further placer mining on federal claims.

Cessation of mining on federal claims would end further short- and long-term impacts upon topography of the public lands. Mining activity on State and private lands would cause the same impacts on topography as for Alternative A.

Gold resources would remain undeveloped on public lands.

Overall water quality would be somewhat better than the Proposed Action, due to fewer mines operating on the streams. Non-point sedimentation would be the same or less than the Proposed Action. Restoration of mined stream reaches would not be required. Approximately 20 additional miles of stream channel would be mined under this alternative.

Soils on public lands would not be further disturbed by mining. Mining on non-federal lands would disturb the soil profile on 391 acres.

There is a long-term unavoidable loss of over 1,750 acres of the vegetation cover in the area from historic mines and roads. Activity on State and private lands would result in 90 acres of shrubs regrowing within 30 to 50 years, and 187 additional acres regrown to shrub in 50 years. Two hundred seventy-one acres would remain barren or sparsely vegetated from this mining.

Approximately 2,383 acres of upland riparian wildlife habitat would remain physically altered because of past mining and related activities in the Wade Creek and Walker Fork drainages, the vicinity of Chicken, and other areas. Continued mining on State and private lands would result in the physical alteration of 271 acres. Periodic disturbances to wildlife due to the operation of mining vehicles, machinery, and human habitation at State and private mines would result in 176,343 acres being subject to short-term adverse effects in localized areas during the mining season. The principal long-term adverse effect of past mining would be the unavoidable loss of approximately 391 acres for a 40 to 50-year period. The long-term cumulative loss of habitat to mining activities in these areas would probably contribute to a low to moderate reduction in moose population potential. The potential exists for long-term cumulative adverse effects to wildlife if State and private mining activity, suction dredging disturbance, and human use of the area increases greatly in crucial wildlife habitats.

Impacts to fish and invertebrate populations from sediment loading would be slightly less than the Proposed Action. Some fish habitat may be degraded or lost without the requirement for restoration of mined stream reaches. Approximately 20 miles of stream would be affected by mining by 1998.

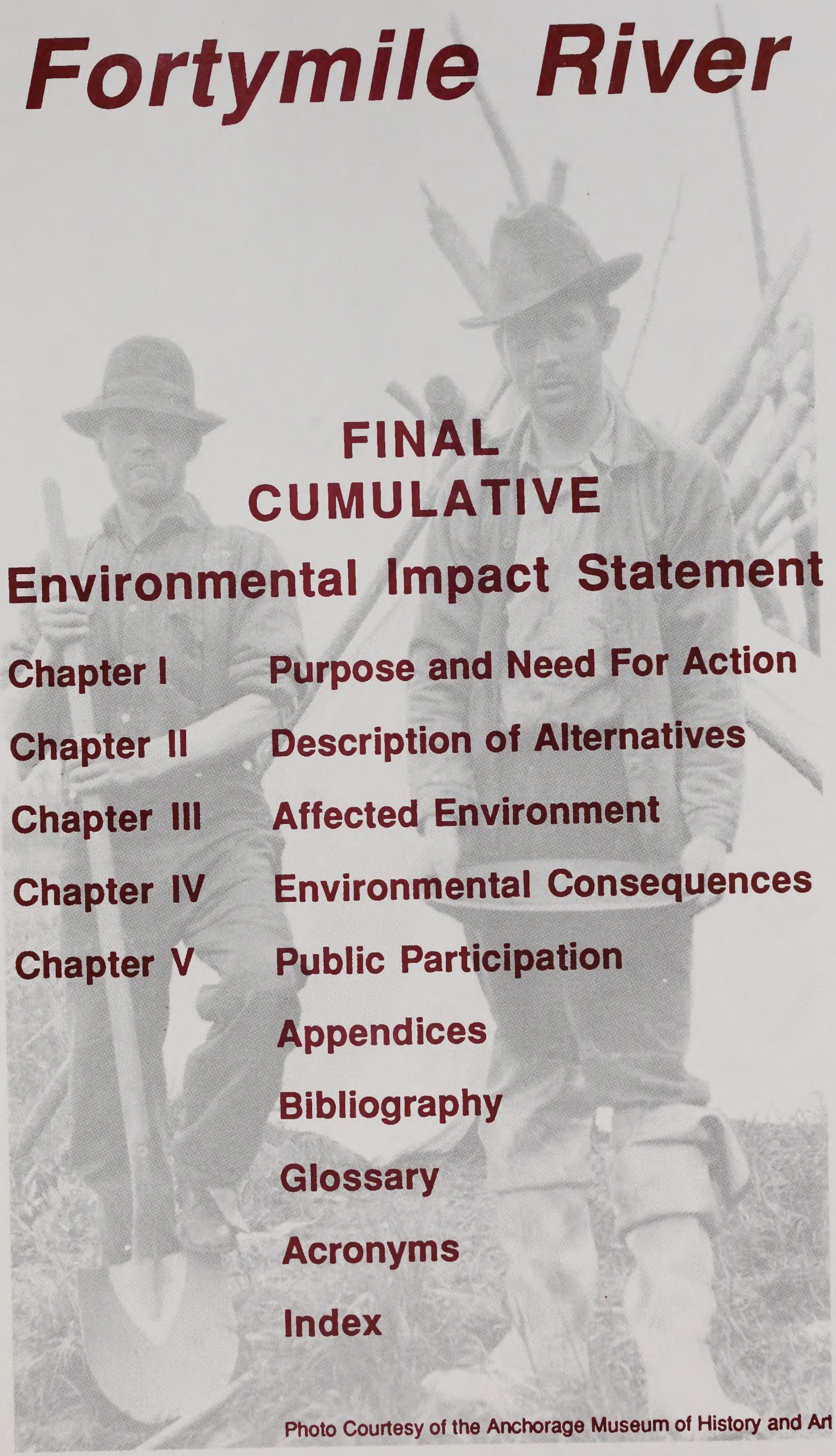
Some motorized recreation activities would be enhanced by the 61% increase in road mileage over the next 10 years. Trails available to small ORVs would decline by 4%. Floatboating use would probably remain at approximately the same level as in 1987, or increase slightly.

Visual impacts to federal land would be reduced slightly due to cessation of mining and reclamation of post-1980 disturbances. Continued mining on State and private lands would increase the visual contrast with the natural landscape. Over a 10-year period, approximately 15% more acreage would be newly disturbed by mining activity. Most visual impacts would persist over the long-term, because reclamation requirements on State and private operations would be essentially the same as under Alternative A.

As the number of operating mines decreases to 17, direct mining employment would decrease over 1987 levels by an average of 59 workers, while over a 10-year period direct earnings would decrease by approximately $16.6 million and output would decrease by approximately $32.8 million. Total employment in the greater Fairbanks area would decrease by 91 workers, earnings would decrease by $25 million, and output would decrease by $55.8 million. Local rural population within the Fortymile River *drainage would decrease by less than 90 people.

Validity exams on all properly filed federal claims would cost the BLM approximately $1,730,000 to complete, and the estimated net present value of all the federal claims within the watershed is between $10,380,000 and $289,775,000 (Appendix B-3).

Fortymile River



FINAL CUMULATIVE Environmental Impact Statement

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Chapter II	Description of Alternatives
Chapter III	Affected Environment
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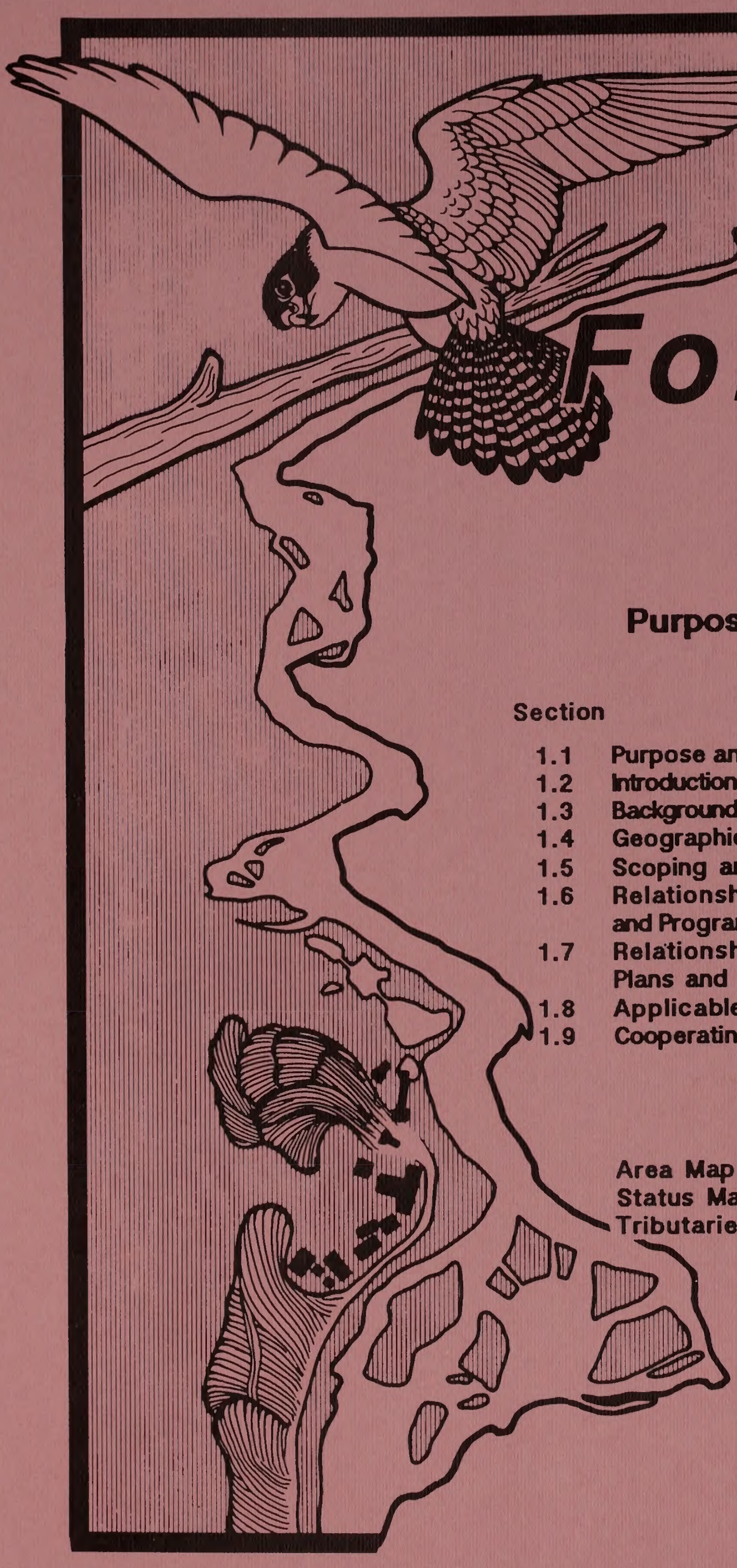

Fortymile River

Chapter I
Purpose and Need for Action

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CHAPTER MAPS

Area Map
Status Map
Tributaries and Main Physical Features Map

1.1 Purpose and Need

There are two primary objectives of this Environmental Impact Statement (EIS). The first is to identify and consider performance standards under which placer mining may be conducted on federal lands in the area, including methods and procedures which will be utilized "...when an activity is being accomplished by a prudent operator in usual, customary, and proficient operations of similar character and taking into consideration the effects of operations on other resources and land uses, including those resources and uses outside the area of operations" (43 CFR 3809.0-5(k)). The second objective is to comply with the court orders (described in Section 1.2) to conduct evaluations and prepare the associated documents under the National Environmental Policy Act (NEPA) and the Alaska National Interest Lands Conservation Act subsistence requirements (ANILCA Section 810). Figure 1-1 identifies the directives from the various court orders and injunctions pertaining to this placer mining EIS, and the products of the EIS process which respond to these directives.

COURT DIRECTIVES	EIS PRODUCTS
1. Identify the degree of environmental harm and benefits.	• Assess cumulative impacts • Consultant studies - e.g. water, fish, and wildlife (Appendix A-1) • Chapter 4
2. Identify the extent that environmental harm can be prevented.	• Identification of alternative actions in Chapter 2 and evaluated in Chapter 4 • Mitigating measures-Chapter 4 • Record of decision • Management under 43 CFR 3809 • EA consultant contracts
3. Identify the expense of preventing some or all of the harm.	• Economic study • Chapters 2 and 4 and the Appendix
4. Identify the economic and social benefits and costs of the matter being evaluated.	• Economic study • Subsistence evaluation Chapter 4
5. Assess cumulative environmental and subsistence impacts.	• Consultant studies including water quality, fish, and aquatic habitats, visual resources and subsistence • Chapters 2 and 4

Figure 1-1. Directives of the District Court Memorandum and the products of the EIS in response.

1.2 Introduction

A United States District Court for the District of Alaska Memorandum and Order (A86-083 Civil) filed on May 14, 1987, instructed the Bureau of Land Management (BLM) to cease approving Plans of Operations for federal placer mines in the Birch Creek watershed after October 1, 1987, pending completion of an adequate cumulative effects Environmental Impact Statement (EIS). On May 28, 1987, injunctions followed which covered the watersheds of Birch Creek, Beaver Creek, the Fortymile River, and Minto Flats (which is comprised of the Chatanika River, Tolovana River, and Goldstream Creek). On July 22, 1987, the Court issued an amendment to the May 14 and May 28 orders, extending the date of cessation to November 15, 1987. The term "lawsuit" hereafter refers to the above orders and injunctions.

At issue for BLM are the impacts of multiple mining operations on the environment, including the cumulative impacts, especially on water quality, visual, and subsistence resources. Initially, under these injunctions, only Plans of Operations on federal claims and long- term camping associated with suction dredging were affected. For the U.S. Army Corps of Engineers (Corps), the principal issues involve avoiding or minimizing impacts to waters and wetlands. Mines operating under Notices (those disturbing five acres or less) were not affected; however, the impacts of such mines are included in this EIS. A subsequent court order of November 6, 1987, requires Plans of Operations for all operations on claims with valid existing rights, regardless of size, on land withdrawn from mineral entry, with a one-year exception for mines which operated in 1987.

An EIS describes, for public review and consideration, a proposed federal action that could significantly affect the human environment. In this case, the Court mandated that cumulative environmental impacts for all placer mining, on State and private, as well as federal lands, should be addressed.

This EIS is based on the National Environmental Policy Act of 1969 (NEPA) and Council on Environmental Quality (CEQ) regulations. Per CEQ regulations, the BLM used an interdisciplinary team in a systematic approach to analyze the affected area, to estimate the environmental effects, and to write this statement. Where data gaps appeared, the BLM used contract services to collect and analyze additional information. The contractors included the State of Alaska and private consulting firms. A list of the consultant contracts is included in Appendix A-1. A list of the EIS preparers is included in Chapter Five.

This EIS is in itself not a decision document meant to change the land use classifications established in prior planning documents. However, if the decision is made in the Record of Decision (ROD) to modify existing land use classifications, then plan amendments would be developed. The ROD will, however, define the overarching terms and conditions under which placer mining may be conducted.

The regulations in 43 CFR 3809.2-1 require preparation of at least an Environmental Assessment (EA) for the approval of a placer mine Plan of Operations. These EA's will tier off this EIS. Tiering is an interrelationship in which reference to a more general NEPA document such as this EIS can

be made in a more specific one, thus avoiding duplication. No Plans of Operations will be approved based solely on this EIS. Also, a more specific environmental assessment will not change or modify decisions resulting from this analysis, but will, on a case-by-case basis, identify more detailed and site-specific actions and mitigation measures to reduce environmental impacts. Tiering can also be used by other agencies, such as the Corps. The Corps may use this EIS as a generalized document for reviewing work in the watershed under the Alaska Corps regulatory program relative to Section 404 of the Clean Water Act.

An environmental assessment on long-term camping (EA No. AK-080-88-010) was completed on April 15, 1988 (DOI 1988c), to assess the existing situation under the "lawsuit" and recommend a course of action to meet the objectives of the Wild and Scenic Rivers Act (P.L. 94-199) as amended. BLM proposed to authorize long-term camping associated with suction dredge mining on State river bed claims within Scenic and Wild segments of the Fortymile National Wild and Scenic River Corridor. The Proposed Action and alternatives were discussed pursuant to the requirements of the National Environmental Policy Act of 1969 (42 USC 4231, et seq.), as amended. Much of the information contained in the assessment is appropriate and is incorporated into this Environmental Impact Statement by reference.

During 1987, approximately 33 mines were active in the Fortymile River drainage. However, additional mining operations on the federal, State, and private mining estate are anticipated within the next ten years. This document analyzes the cumulative impacts of these anticipated future mining activities in conjunction with historic and current mining.

The draft EIS for the Fortymile River drainage did not include an assessment of the Mosquito Fork, because it was excluded in the court injunction. However, the final EIS includes a complete examination which encompasses the Mosquito Fork segment and watershed of the Fortymile National Wild and Scenic River, upstream of the Taylor Highway bridge.

1.3 Background

BLM manages mining under the General Mining Law of 1872, 30 USC 22 et seq, as amended, and the Federal Land Policy and Management Act (FLPMA) of 1976, 43 USC 1701, et seq. The 1872 Mining Law provides for the exploration, development, production, and purchase of mineral resources on public lands, as well as the right of access to mining claims.

FLPMA provides that, in managing the public lands, the Secretary of Interior shall take any action required to prevent "unnecessary or undue" degradation of the land. This FLPMA provision is implemented by the Code of Federal Regulations (CFR) section covering surface management (43 CFR 3809). Additionally, specific terms and conditions for placer mining and other land uses are defined in the Fortymile National Wild and Scenic River Management Plan.

Section 302 of FLPMA provides authority for use and occupancy management under the principles of multiple use and sustained yield while preventing unnecessary or undue degradation of the lands. Permits for long-term camping are issued pursuant to 43 CFR 2920.2-2 and subject to provisions necessary to protect scenic, recreational, and other values of the Fortymile River system.

The Clean Water Act, Section 404, applies to the placement of dredged and/or fill material into waters of the United States, including wetlands. Regulations of Section 404 for the Corps are at 33 CFR 320 et seq. Procedures for Implementing NEPA for the Corps are at 33 CFR 230 and 325.

The crux of the present concern is the nature, degree, and extent of the cumulative impacts of mining and related activities on the physical, biological, and socio-economic environment in the four watersheds the Court identified. In particular, the cumulative effects and impacts of placer mining need to be clearly explained and fully analyzed. The CEQ regulations at 40 CFR 1508.7 define cumulative impacts as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time."

Because of uncertainty surrounding the number of mines that may operate in the reasonably foreseeable future, a methodology was established by forecasting the price of gold in the future and the number of mines that BLM might expect to operate in the next ten years (Appendix B-1). Additionally, although it is believed to be highly unlikely, a worst-case scenario was developed and analyzed.

This EIS will focus on the portions of the Fortymile watershed shown on the Area Map in this chapter.

1.4 Geographic Setting and Land Status

The Fortymile River watershed is approximately 120 miles southeast of Fairbanks and encompasses nearly 4 million acres. The drainage lies within the Upper Yukon - Canada Subregion physiographic province. Topography consists of gently sloping hills 3,000 to 6,000 feet in elevation and broad alluvial valleys approximately 2,000 feet above sea level. The highest point in the study area is Mount Eldridge (6,250 feet) and the lowest point is in the southern portion near Dennison Fork, approximately 2,000 feet above sea level. An "Area Map" depicting major features, one entitled "Status" showing land status, and the "Tributaries and Main Physical Features Map" showing topography can be found in this chapter.

The Fortymile River is formed at the junction of its North and South Forks and flows northeast 60 miles to its mouth at the Yukon River, approximately 30 miles southeast of Eagle, Alaska.

The climate of the Fortymile River area is fairly typical of eastern Interior Alaska with cold, dry winters and warm, but short summers. Climate data for Eagle, for instance, shows a mean January temperature of -15° F and a July mean of 72° F, although temperatures can be less than -75° F in winter, and exceed 95° F in summer. Precipitation at Eagle averages 13 inches a year, which includes 50 inches of snow.

The majority of the lands within the Fortymile River watershed below the intersection of the North Fork and the Main Stem have been tentatively approved for conveyance to the State of Alaska. At this time, the State does not have a land use plan for this area, although one is scheduled for development. Until this plan is completed, the lands will continue under the present management, which does not provide for land disposal or development, and calls for examination of use applications and permits on a case-by-case basis. The State of Alaska holds the riverbed in public trust and has the responsibility to manage mining with respect to recreation, fishing, navigation, commerce and related purposes so public uses are not substantially impaired (Atty. Gen. Op. #3, File A66-061-82). Authority is exercised by the State of Alaska under the Alaska Administrative Code as it pertains to navigable waters, water quality, general provisions for pollution control, mining, and access (DOI 1988c).

The BLM found parts of the river navigable in 1983; navigable river segments total 90 miles (23%) of the entire Wild and Scenic River System (Subject to Gulkana Decision #662, F. Supp, p. 455, on appeal to the 9th Circuit Court). The State owns and is responsible for management of the subject riverbed where the river was navigable for purposes of title in 1959 (Submerged Lands Act of 1953). The riverbed extends to the ordinary high water mark on either bank. Placer mining claims within these portions of the riverbed are staked and mined under State of Alaska mining laws and BLM has no authority or jurisdiction to regulate such activities (DOI 1988c). The Wild and Scenic Rivers Act in Section 13(d) states, "The jurisdiction of the States over waters of any stream included in a national wild, scenic, or recreational river area shall be unaffected by this act to the extent that such jurisdiction may be exercised without impairing the purposes of this Act or its administration."

There are large blocks of Native selected lands in the northern and southwestern portions of the watershed, and some of the northern lands are interim conveyed.

BLM is responsible for and manages public lands within the designated Wild and Scenic River corridor as well as some scattered lands, mostly adjoining or near the corridor in the northern portion of the watershed. ANILCA amended the Wild and Scenic Rivers Act so the corridor boundary would not include any lands owned by the State (16 USC 11285b) (Status Map).

1.5 Scoping and Major Issues

As required by NEPA regulations, BLM used an open process to gather public input. Initially, this was accomplished by conducting a series of public scoping meetings in locations throughout the affected area in September and October 1987.

The Notice of Intent to prepare the environmental impact statements was published in the Federal Register on August 18, 1987, and in local newspapers in late August 1987.

Scoping meetings were held between September 9, and October 6, 1987, at Livengood, Minto, Central, Chicken, Birch Creek Village, Fairbanks, and Anchorage, Alaska. Prior to these meetings, more than 450 notices of the public meetings were sent out to miners, environmentalists, Native groups, and other interested publics.

BLM also invited participation from other government agencies, private organizations, the placer mining industry, and concerned individuals. At the scoping meetings a description of the EIS process and the proposed activity was provided by the appropriate BLM District Managers. The meetings were then opened to members of the public to voice their concerns and to ask any questions about the issues. All comments were recorded on tape. Members of the public wishing to submit written comments on scoping and issues were requested to do so before October 20, 1987. All written and oral presentations were considered and incorporated into a list of significant issues.

Significant issues include:

- **What are the impacts of placer mining operations on water quality?**
- **How are water quality standards regulated and enforced and who performs this function?**
- **What are the impacts of placer mining on terrestrial and aquatic habitats?**
- **What are the impacts of placer mining on subsistence?**
- **Have reclamation practices and management under the 43 CFR 3809 regulations improved since 1981?**
- **What are the impacts of other agency laws and regulations on the placer mining industry?**

Specific coordination meetings were held with various State of Alaska agencies such as the Department of Natural Resources (DNR), Department of Environmental Conservation (ADEC), Department of Fish and Game (ADF&G), and the Office of Management and Budget, Office of the Governor. Meetings were also held with the U.S. Environmental Protection Agency (EPA), U.S. Army Corps of Engineers (Corps), the National Park Service (NPS), U.S. Bureau of Mines (BOM) and the U.S. Fish and Wildlife Service (USFWS).

By December 1, 1987, more than 32 written responses were received. Chapter Five, Consultation and Coordination, identifies the contacts, participation, and coordination more fully.

1.6 Relationship to BLM Policies, Plans and Programs

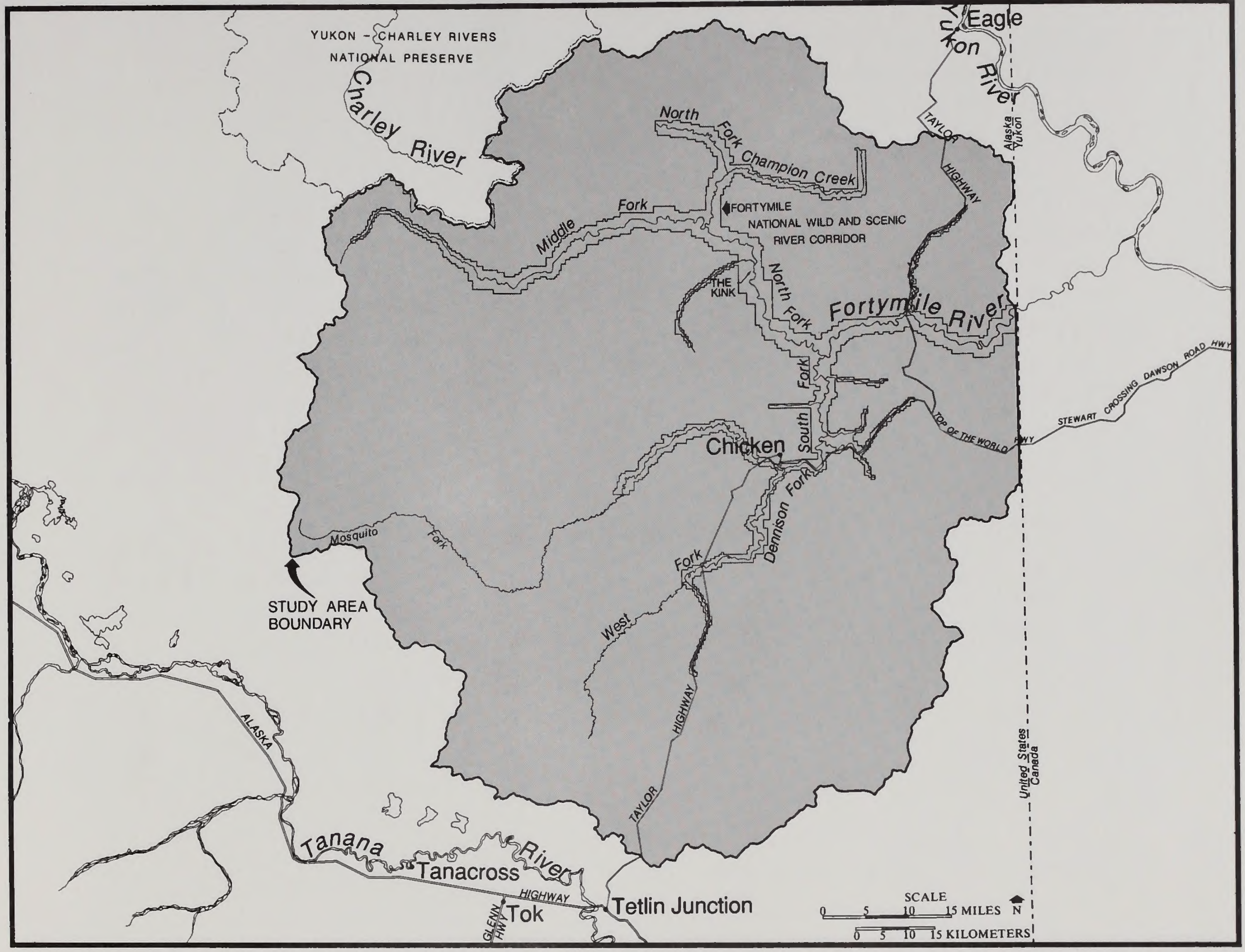
Management on BLM lands is guided by existing laws, established planning documents, and programmatic and regulatory guidelines.

Fortymile River Placer Mining

FINAL

Cumulative Environmental Impact Statement

Area Map



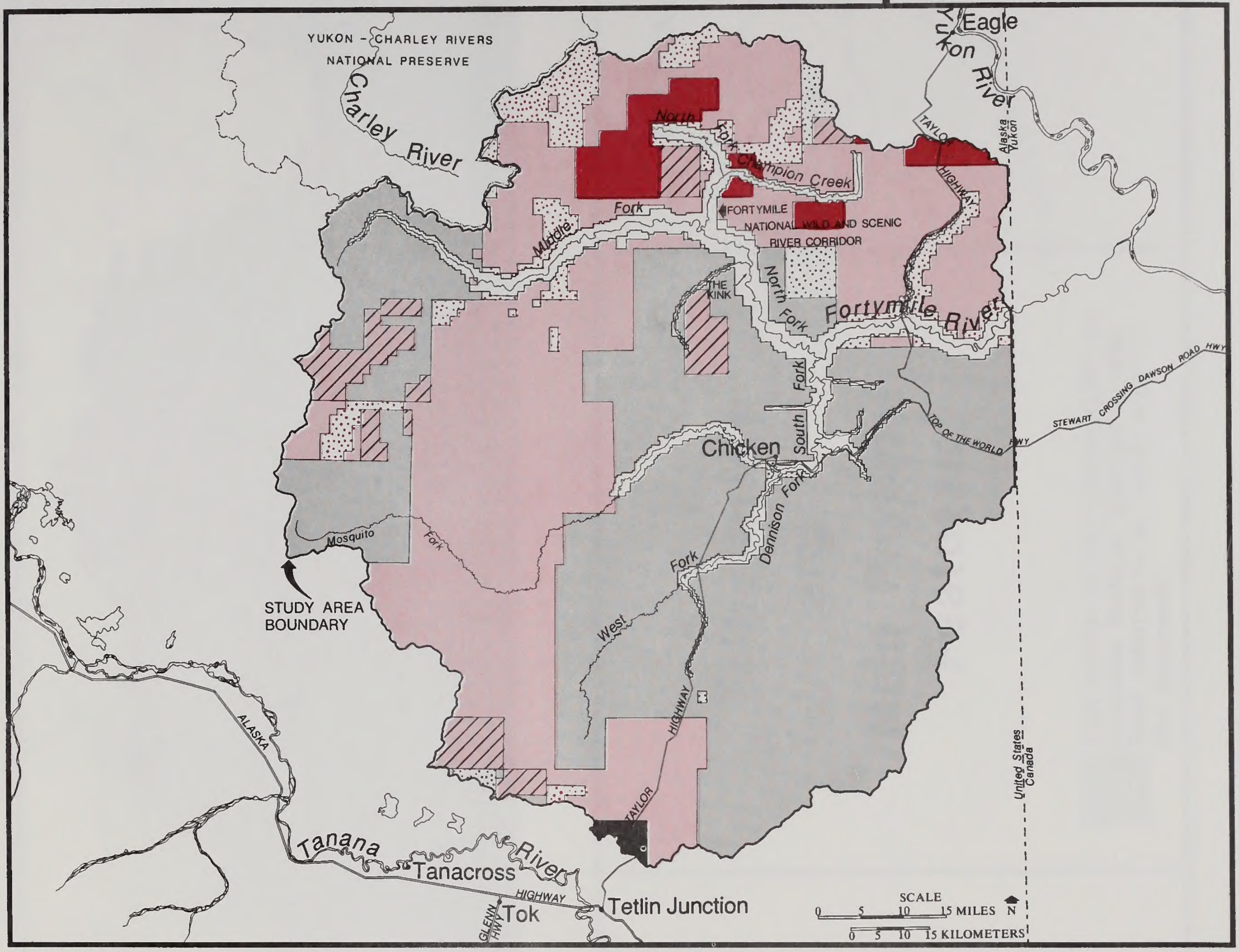
Legend

That portion of the watershed for the Fortymile National Wild and Scenic River referred to as "study area" in this document.

LOCATION MAP

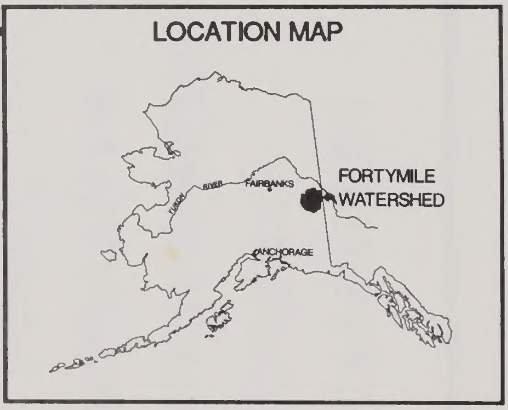
Fortymile River Placer Mining FINAL Cumulative Environmental Impact Statement

Status



Legend

- Tentatively approved State lands-within watershed only
- Patented State lands-within watershed only
- Topfiled or suspended State selected lands- within watershed only
- State selected lands- within watershed only
- Interim conveyed Native lands- within watershed only
- Native selected lands- within watershed only
- Unselected public lands- within watershed only



Fortymile River

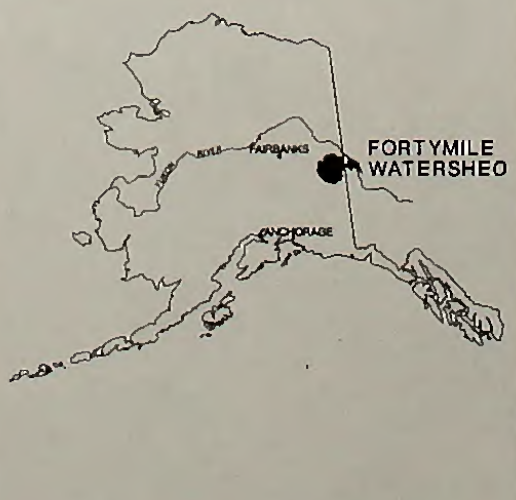
Placer Mining

FINAL Cumulative Environmental Impact Statement

Tributaries and Main Physical Features

That portion of the watershed for the Fortymile National Wild and Scenic River referred to as "study area" in this document.

LOCATION MAP



The legal framework is particularly complex, with more recent legislation aimed at environmental conservation which partially modifies, but does not replace, previous legislation that provides for use and development of the public land resources. The following laws and regulations provide the basic guidance for BLM's day-to-day management of the area affected by this EIS:

- General Mining Law of 1872, 30 U.S.C. Sec 22 et seq., as amended.
- Wild and Scenic Rivers Act. P.L. 90-542, October 2, 1968 (82 Stat 906).
- Federal Land Policy and Management Act of 1976 (FLPMA), P.L. 94-579, October 21, 1976, 43 U.S.C. 1707, et seq.
- Alaska National Interest Lands Conservation Act (ANILCA), P.L. 96-487 (94 Stat. 2371), Dec. 2, 1980.
- Surface Management of Public Lands Under the U.S. Mining Laws, 43 CFR 3809.

The above plans, laws, and policies identify the general standards under which placer mining may take place in the Fortymile River drainage. The interrelationships of these documents in guiding management of placer mining can be summarized as follows:

Mining Laws

The 1872 Mining Law provides for the exploration, development, production, and purchase of mineral resources of the public lands, as well as the right of access to mining claims, as had been provided by the Act of July 26, 1866 (39 Stat. 52, et seq.). These laws were designed to facilitate the disposal of mineral resources and did not provide any environmental safeguards. Subsequent legislation modified the mining law to assure that other values would be protected.

FLPMA

Congress, in FLPMA, [43 USC 1732(b)] provided that "in managing the public lands the Secretary shall, by regulation or otherwise, take any action necessary to prevent unnecessary or undue degradation of the lands." With this notable exception, and several other specific sections governing procedures for recordation of mining claims and other topics, FLPMA provided that "no provision...of this Act shall in any way amend the Mining Law of 1872, or impair the rights of any locators or claims under that Act...."

Mining Regulations in 43 CFR 3809

The regulations in 43 CFR 3809 were formulated to establish procedures to prevent unnecessary or undue degradation of federal lands which could result from operations authorized by the mining laws. In 43 CFR 3809.0-5(k) "unnecessary or undue degradation" is defined as "surface disturbance greater than what would normally result when an activity is being accomplished by a prudent operator in usual, customary, and proficient operations of a similar character...." Failure to initiate and complete reasonable reclamation may, and failure to comply with applicable environmental statutes will, constitute unnecessary or undue degradation. The BLM has recognized this by making compliance with these regulations a specific requirement for any mining operation (43 CFR 3809.2-2).

ANILCA

ANILCA Section 603(48) designated portions of the Fortymile River and tributaries as part of the National Wild and Scenic Rivers System (Recreation Map, Section 3.10).

Section 10(a) of the Wild and Scenic Rivers Act provides direction for management of the Fortymile National Wild, Scenic and Recreation River:

> "Each component of the National Wild and Scenic Rivers System shall be administered in such a manner as to protect and enhance the values which caused it to be included in said system without, insofar as it is consistent therewith, limiting other uses that do not substantially interfere with public use and enjoyment of these values...."

The Wild and Scenic Rivers Act withdrew all components of the National Wild and Scenic Rivers System then or subsequently designated from disposition under the public land laws, including further mineral entry (the location of new mining claims). However, except as specifically provided, nothing contained within the designation affects the applicability of the U.S. mining laws. Both the Wild and Scenic Rivers Act and ANILCA direct the managing agency to recognize valid existing rights when administering the areas for the purposes for which they were primarily established.

ANILCA Section 605(d) requires BLM to establish boundaries and to complete an individual management plan for the Fortymile NWR, a requirement which was met by preparing the River Management Plan for the Fortymile National Wild and Scenic River, December 1983.

Fortymile River Management Framework Plan

The area was first included in the "Fortymile River Management Framework Plan" of September 8, 1980 (DOI 1980a), conducted under Section 202 of FLPMA. Activities such as long-term camping were authorized when findings of no significant impact were made. Land use proposals were required to meet a variety of objectives such as protection of threatened or endangered plant and wildlife species, preservation of cultural resources, meeting or exceeding State water quality standards and maintaining or improving the quality of visual resources.

Fortymile National Wild and Scenic River Management Plan

Special interest groups, governmental agencies, and the general public were invited to comment and identify specific issues to be considered throughout the planning process. Long-term camping and suction dredge mining became major issues addressed in the final plan. As a result, long-term camping associated with suction dredge mining is authorized by permit and subject to provisions necessary to protect scenic, recreational, and other values of the Fortymile National Wild and Scenic River.

Management Action 6.1 of the Management Plan states a permit is required for "camping more than ten days within the river corridor during any on calendar year." BLM has prepared an EA which addresses long-term camping in the Fortymile National Wild and Scenic River system (DOI 1988c).

Other Laws and Regulations

BLM would continue to review and authorize individual Plans of Operations for placer mining under 43 CFR 3809 and the Alaska 3809 Handbook, as well as other applicable laws and regulations. Besides the laws cited in this section, other laws, administered principally by agencies other than BLM, regulate placer mining.

Figure 1-2 illustrates some of the different guidelines and responsibilities of BLM, other federal agencies, and the State of Alaska in managing placer mining on the public lands. The following section more fully describes the roles of other agencies.

Agency	Legal Guidelines & Plans for Management	Responsibility of Agency	Enforcement Responsibility of Agency
BLM	Management Frame-work Plan Section 302/310 FLPMA	Surface management	Prevent unnecessary or undue degradation. Promulgate rules and regulations.
EPA	Section 401 of Clean Water Act	Water quality	Water standards
Corps	Clean Water Act	Fill materials in waters and wetlands	Terms and conditions of DA permits
State of Alaska	AS 16.10.840 AS 16.05.870 AS 46 and 18 AAC 30, 31, 50, 60, 62, 64, 70-72, 75, 80	Fish passage Anadromous fish Air, land and water quality	State Standards

Figure 1-2. General responsibilities of applicable agencies concerning placer mining. This table applies to State, Federal and private mines. BLM evaluates the cumulative impacts of all mines, but can only manage within its jurisidiction.

1.7 Relationship to Non-BLM Policies, Plans and Programs

Approval of a Plan of Operations is contingent on the operator meeting all other applicable State and federal laws and regulations. These include appropriate water quality standards promulgated by EPA and Alaska DEC.

Clean Water Act

Water quality and its associated environmental problems are extensively regulated by statutes which BLM does not administer. The principal federal regulatory device to ensure water quality is the Clean Water Act, 33 USC 1251, et seq. The Corps regulates placement of dredged and/or fill material in waters and wetlands under the Clean Water Act.

Regulation of Water Pollution

Water pollution control is specifically regulated and permitted on the federal level by the EPA and the Corps (33 USC 1331, 1342, 1344), and by the State of Alaska (A.S. 46.030.50). Water quality standards are established and certified by the State (33 USC 1313, 1341).

> "Where the BLM has evidence of suspected noncompliance with the State or federal water quality laws and regulations, the appropriate office of the EPA and/or DEC will be notified. The EPA and/or DEC have the responsibility for enforcement of the Federal Water Pollution Control Act and applicable regulations" (DOI 1986a).

EPA regulates effluent. The EPA guidelines specify that open-cut mines that process over 1,500 cubic yards of ore per year must have a resultant volume of process wastewater which does not exceed the volume of infiltration, drainage and mine drainage waters that is in excess of the make-up water required for operation. The concentration of pollutants in discharged process wastewater must not exceed an instantaneous maximum settleable solid limit of 0.2 ml/l. EPA issues National Pollution Discharge Elimination System (NPDES) permits, which must take into account State water quality requirements. In Alaska, these permits are issued by Region 10 and include limits on arsenic and turbidity based on the Alaska water quality standards.

This EIS evaluates standards of various agencies in the alternatives. While BLM cannot implement other agency standards, it can assess the cumulative impacts of these standards.

Other Agency Plans

The Fortymile River is located in an unorganized borough where no State or local land use plans exist. No special State designations are employed to complement the Congressional designation of the Wild and Scenic River, although certain activities are subject to the Alaska Administrative Code. The Fortymile drainage is identified as a priority stream system in the interagency placer mining enforcement priorities (DOI 1988c). The Fortymile River watershed is covered by the Alaska Interagency Fire Management Plan of the Upper Yukon (AIFMC 1984).

Alaska Statute 38.05.185 suggests that the State recognizes there may be significant uses of uplands adjoining navigable rivers where mining is allowed on the riverbed. The statute provides the opportunity for the Commissioner to adjust the mining use of the riverbed in support of a [significant surface] use (Atty. Gen. Op. #3, File A66-061-82).

1.8 Applicable Laws and Regulations

BLM and the Corps must comply with a multitude of other laws, regulations, and federal Executive Orders, in addition to the primary ones cited in Sections 1.6 and 1.7. Figure 1-3 summarizes elements which must be addressed in every environmental impact statement, the source of that requirement, and how the element is addressed in this EIS.

ELEMENT	SOURCE OF REQUIREMENT	TREATMENT IN THIS EIS
Air Quality	The Clean Air Act as amended (42 USC 7401 et seq.)	Would not be affected. 43 CFR 3809 regulations require operators to comply with applicable federal/State standards
Areas of Critical Environmental Concern	Federal Land Policy and Management Act of 1976 (43 USC 1701 et seq.)	None in the affected area
Cultural, Historical, and Paleontological Resources	National Historic Preservation Act as amended (16 USC 470) Antiquities Act of 1906 (16 USC 431-433)	Sections 3.8 and 4.8
Endangered or Threatened Species	Endangered Species Act of 1973 as amended (16 USC 1531)	Sections 3.5.4, 3.6.1, 4.6.7
Farm Lands (prime or unique)	Surface Mining Control and Reclamation Act of 1977 (30 USC 1201 et seq.)	None within the affected area
Flood Plains	E.O. 11988, as amended, Flood Plain Management, 5/24/77	Public notification and review will be provided for as EA's are prepared for individual operations within a flood plain
Subsistence	ANILCA Section 810	Sections 3.9 and 4.9
Wastes, Hazardous or Solid	Resource Conservation and Recovery Act of 1976 (42 USC 6901 et seq.) Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended (42 USC 9615)	Sections 3.4 and 4.4
Water, Drinking/ Ground/Quality	Safe Drinking Water Act as amended (42 USC 300f et seq.) Clean Water Act of 1977 (33 USC 1251 et seq.)	Sections 3.4, 4.4, 4.9.1-4.9.5
Wetlands	E.O. 11990, Protection of Wetlands, 5/24/77	Sections 3.5.2.
Wild and Scenic Rivers	Wild and Scenic Rivers Act as amended (16 USC 1271)	Fortymile River-Sections 3.10 and 4.10
Wilderness	Federal Land Policy and Management Act of 1976 (43 USC 1701 et seq.) Wilderness Act of 1964 (16 USC 1131 et seq.)	None in the affected area
Energy	40 CFR 1502.16(e)	Not applicable
Coastal Zones	Coastal Zone Management Act of 1972 (16 USC 1451)	None in the affected area
Noise	Noise Control Act of 1970 (42 USC 4902 (b))	Not applicable

Figure 1-3. Elements required to be addressed in an EIS and their treatment in this EIS.

1.9 Cooperating Agency

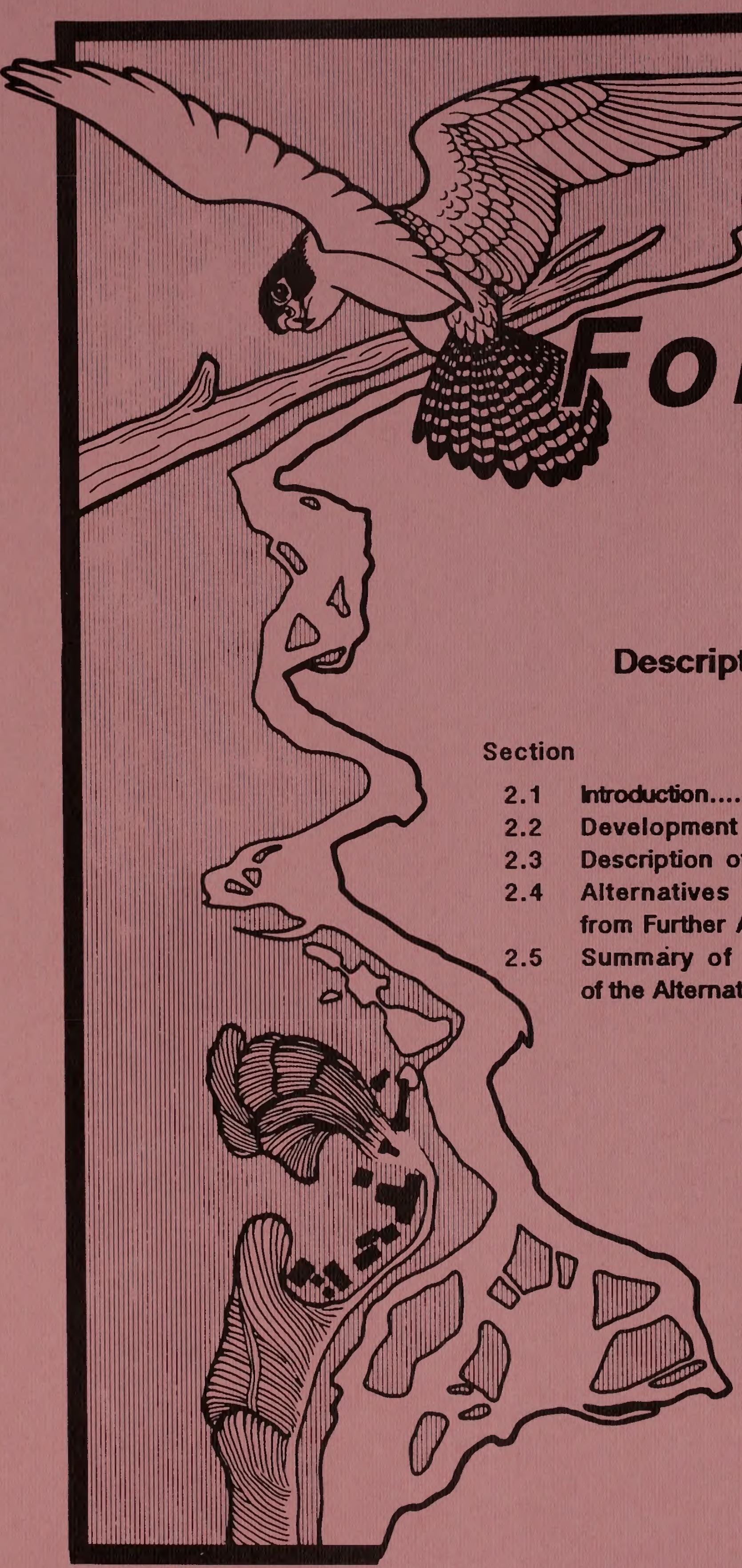
The U.S. Army Corps of Engineers is a cooperating agency on this EIS. To the extent possible, this EIS provides NEPA documentation that can be incorporated into future authorization of work by the Corps.

Numerous activities associated with placer mining require Department of the Army authorization pursuant to Section 404 of the Clean Water Act. Activities requiring authorization include, but are not limited to, the following: placement of dredged and/or fill material into waters of the United States including wetlands, stockpiling overburden and placer-bearing deposits, construction of stream diversions, construction of roads and foundation pads, reclamation, and similar works.

At the present time, the Corps does not have reclamation standards for placer mining, nor is it in the process of developing such standards. Any reclamation required by Department of the Army (DA) permit will be determined on a case-by-case, site-specific basis for each individually authorized project. In addition, certain requirements for reclamation may be associated with general permits (GP) and/or any special procedures such as the proposed abbreviated processing (APP), if issued.

As a cooperating agency, the Corps assisted BLM in the scoping processes and in reviewing the development of the draft and final Environmental Impact Statement. Their review and comments pertain to Corps areas of jurisdiction and authority, i.e., flood control, navigation, and regulatory functions. Members of the Corps staff have contributed consultation and document review to the preparation of the EIS to ensure that the procedural and statutory requirements of the Corps are satisfied.

The Corps's permit program regulates development of the nation's waters and wetlands through its public interest review process. Within the Fortymile River watershed, the Corps has jurisdiction over work subject to Section 404 of the Clean Water Act, i.e., the placement of dredged and/or fill material into waters of the United States, including wetlands, stockpiling overburden and placer-bearing deposits, construction of stream diversions, roads and foundation pads, reclamation, and similar works. Issuance of a DA permit is required for work proposed on State and private mines as well as federal mining operations. See Appendix F-1 for a description of the Corps regulatory program.



Fortymile River

Chapter II
Description of Alternatives

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2.1 Introduction

The National Environmental Policy Act (NEPA) and the corresponding Council on Environmental Quality (CEQ) regulations require development of alternatives for a Proposed Action. This Proposed Action and the alternatives to it are the base for the comparative analysis of environmental consequences. The purpose of the alternatives is to provide a range of management options for the final decision about the Proposed Action. See Figure 2-6 at the end of this chapter for a comparison of pre-1981 impacts with those of the 1987 mining season, and projected 1998 impacts under the Proposed Action and the alternatives.

2.2 Development of the Alternatives

The alternatives have been designed to address the two major objectives of the study (Section 1.1): 1) consider performance standards under which placer mining and long-term camping associated with suction dredging may be conducted on federal lands in the area, and 2) comply with court orders to conduct a cumulative impact environmental analysis for the Fortymile River watershed and prepare the corresponding documents.

Additionally, issues and concerns raised by the public and other agencies were carefully considered and incorporated into the final alternatives where appropriate. Public comments from scoping are summarized in Chapter One.

An initial set of alternatives was published in the Notice of Intent for the preparation of this and the Beaver Creek, Birch Creek, and Minto Flats placer mining EISs (DOI 1987a). These alternatives provided a basis for discussion with interested public groups, individuals, and other agencies during the scoping period. After scoping by interested public groups and other agencies, the alternatives were finalized (Section 2.3). These alternatives are the framework for the analysis of the environmental effects and the cumulative impacts of these effects. Action scenarios were developed for the standards outlined in each alternative. These are mining techniques that could be used to meet the performance standards. Environmental impacts were analyzed from these mining techniques (Figure 2-1).

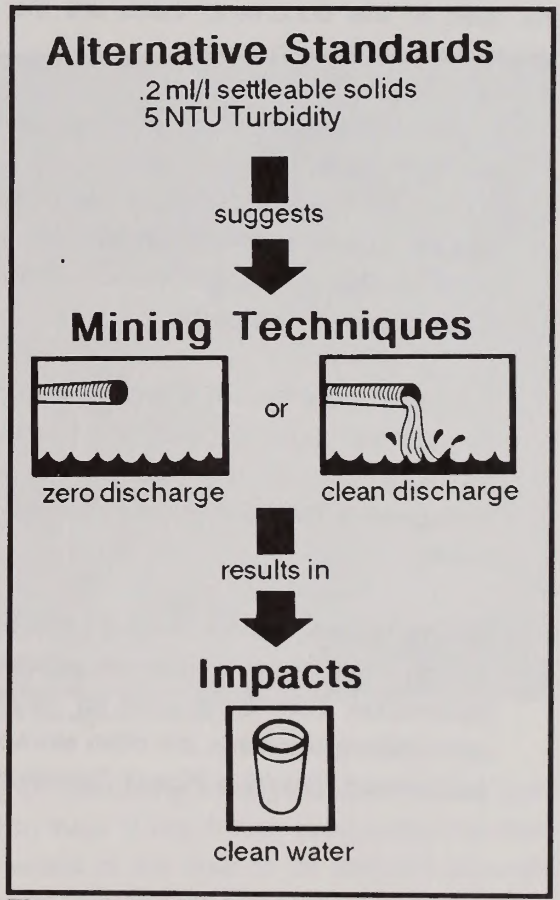


Figure 2-1. Relationship of standards, mining techniques, and impacts.

2.3 Description of the Alternatives

Alternatives for this study are based on a range of performance standards. For BLM, the standards are based on the jurisdiction BLM has within the 43 CFR 3809 regulations, the Fortymile National Wild and Scenic River Management Plan, and mandates of the court injunctions. **Other standards used to evaluate cumulative impacts lie within the regulatory and enforcement authority of other State and federal agencies.**

The 43 CFR 3809 regulations are general, and allow some interpretation in two main areas: 1) the application of the definition of unnecessary or undue degradation to the environment relative to specific operations, and 2) reclamation of surface disturbance. Performance standards are used to form the spectrum of the EIS alternatives for these two areas. One alternative addresses performance standards under discussion by other agencies. Alternative D, the "no mining" alternative, is defined as the "no action" alternative.

Permits for long-term camping associated with suction dredging are issued pursuant to 43 CFR 2920.2-2 and subject to provisions necessary to protect scenic, recreational, and other values of the Fortymile River system.

As used in this document, these are the definitions for performance standards, management goals, and mining techniques:

A **performance standard** is a measurable quantity which determines the allowable environmental impacts resulting from mining and related activities in the Fortymile River watershed (Figure 2-1). These standards set maximum or minimum limits that must be met to legally operate a mine in the watershed. The standards for the watershed are based on the overall goals established by the Fortymile National Wild and Scenic River Management Plan, and the specific resources present.

A **management goal** is a broad overarching purpose for an area. Goals have been developed through the planning processes of BLM and other agencies for the watersheds being considered in this and other studies. For example, the Fortymile National Wild and Scenic River Management Plan discusses goals and actions for mineral development and improving water quality.

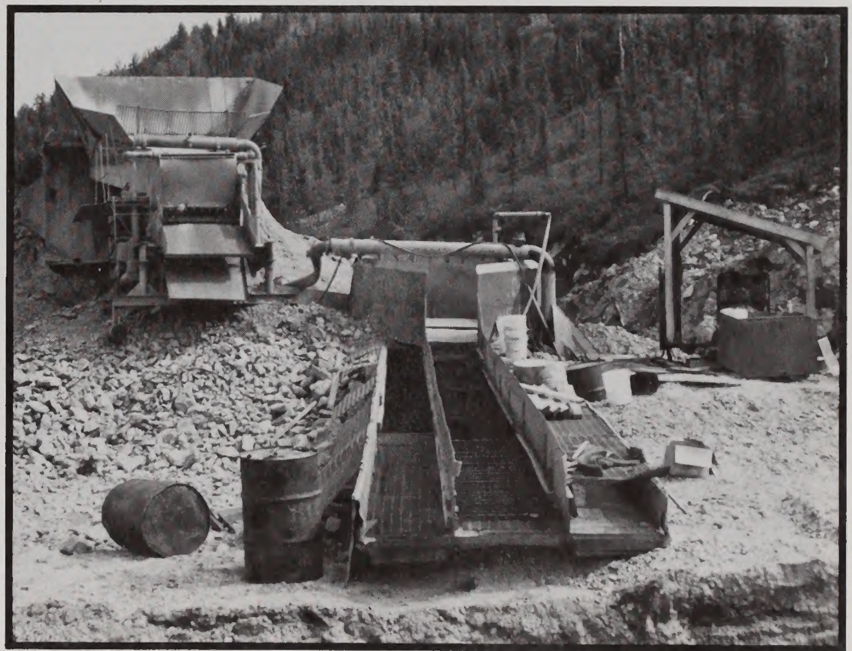
Mining techniques are the methods miners employ to operate their mines. Mining techniques include activities associated with exploration, access, site development, mineral extraction, and reclamation. Techniques used for mining and mitigation measures that are used to meet the performance standards are often site-specific and are defined in the appropriate Environmental Assessment (EA) for a Plan of Operations and permit to long-term camp.

Action Scenario for Mining and Reclamation Activities

There are several mining methods available that could be used to achieve the identified standards. One such scenario is presented here as an example. Other methods are presented in varying detail in numerous publications, such as "Best Management Practices for Placer Mining" (ADF&G 1986a) and "Placer Mining Demonstration Grant Project Final Report" (ADEC 1987c). These other mining methods and their associated surface disturbances are similar to the mining method and surface disturbance descriptions that follow.

Upland Mining

After mining equipment has been transported to the site, a camp is set up for the duration of the season. The mining season generally lasts from June until the ground freezes in late September or October. The camp usually accommodates from two to five people with support facilities for maintenance and storage. After the camp is established, the associated physical mining infrastructure is constructed with a bulldozer or other earth moving equipment. This infrastructure usually consists of two or more settling ponds, associated dikes and spillways, drainage ditches to prevent erosion and collect runoff and groundwater, and working areas for the washplant, pumps, and motors. If the area to be mined is within an active stream channel, a bypass is built to route the water around the mining area. The bypass is diked to withstand ordinary floods and to keep contaminated mine water from entering the stream.



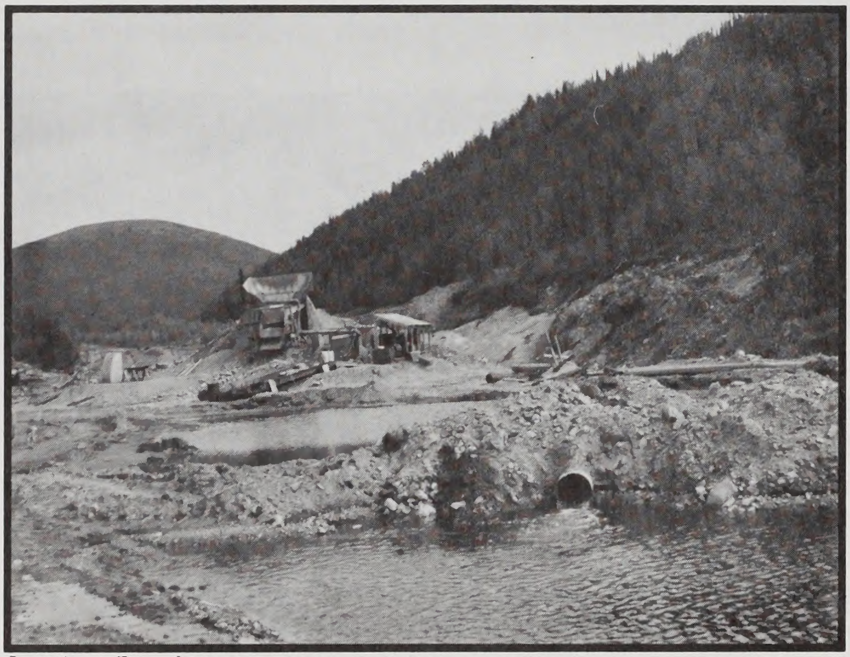
Sluice box. Bureau of Land Management Photo.

Actual mining activities usually begin after the infrastructure has been constructed. Trees and brush are cleared, and topsoil and overburden are stripped from the area to be mined. The stripped topsoil and overburden are stockpiled (separately if possible) usually near the mine cut, and are protected from erosion and flooding. With adequate planning, these stockpiles may be placed in a manner that promotes efficient site reclamation through reduced material handling and shorter hauling distances. Topsoil may have been stripped during the preceding mining season to allow permafrost in layers of overburden or gold-bearing gravel to thaw. If not, frozen overburden and topsoil may be ripped and stockpiled by bulldozer. The extent of the area to be stripped depends upon the expected rate of production. On a typical mine, one to two acres are usually stripped

before actual mining begins. Total disturbance for an entire mine at any one time averages between three and eight acres, although some of the larger mines may disturb up to 25 acres.

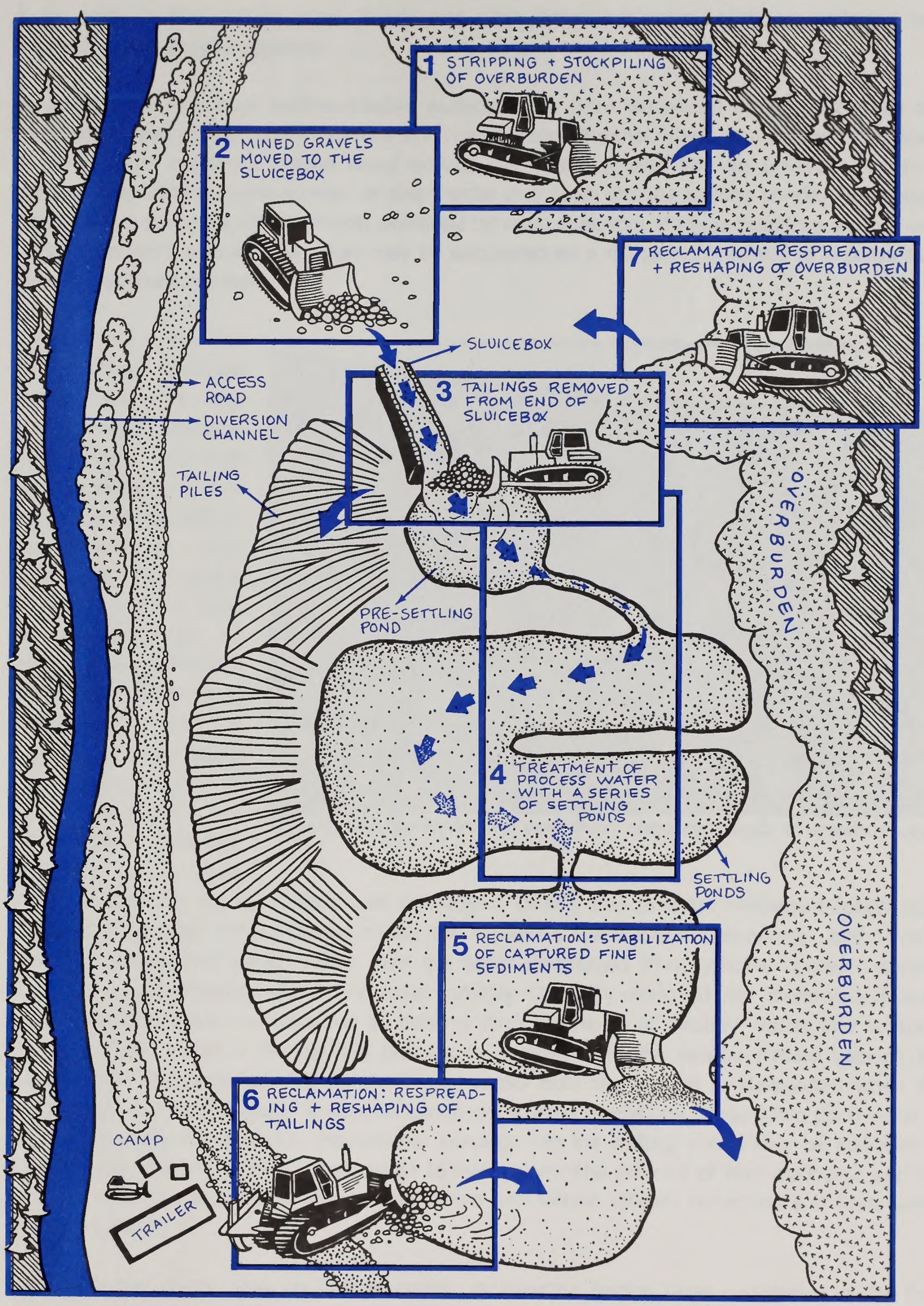
Exposed gold-bearing gravels are usually mined using a bulldozer that pushes and stockpiles the gravel near the washplant. A few operations use a dragline for these tasks. The stockpiled gold-bearing gravel is then fed into the washplant by a front-end loader or large backhoe. This practice promotes equipment efficiency by allowing the bulldozer or dragline to continue mining while the loader or backhoe feeds the washplant at a steady rate. Hydraulic stripping is another method of removing overburden and is particularly efficient when the overburden thickness is considerable. This method usually requires a very large water treatment system due to the huge quantities of water used in washing away the overburden. The removed overburden is captured in settling ponds designed for that purpose.

When the mined gravel is fed into the washplant, it is classified by size using various stationary or vibrating screens. Classifying provides for more efficient gold recovery, reduced water consumption, and facilitation of mine site rehabilitation, and is practiced by most mine operators. The oversize material, usually larger than two inches, slides out of the washplant into a pile where it is moved by a front-end loader or bulldozer. The undersize material and gold-bearing gravel is mixed with water and flows through the sluice box where the gold and heavy black sands are concentrated. Tailings are the gravel, sand, and other materials which accumulate at the end of the sluice box. Tailings are routinely removed by a loader or pushed away by a bulldozer.



Settling Ponds. Bureau of Land Management Photo.

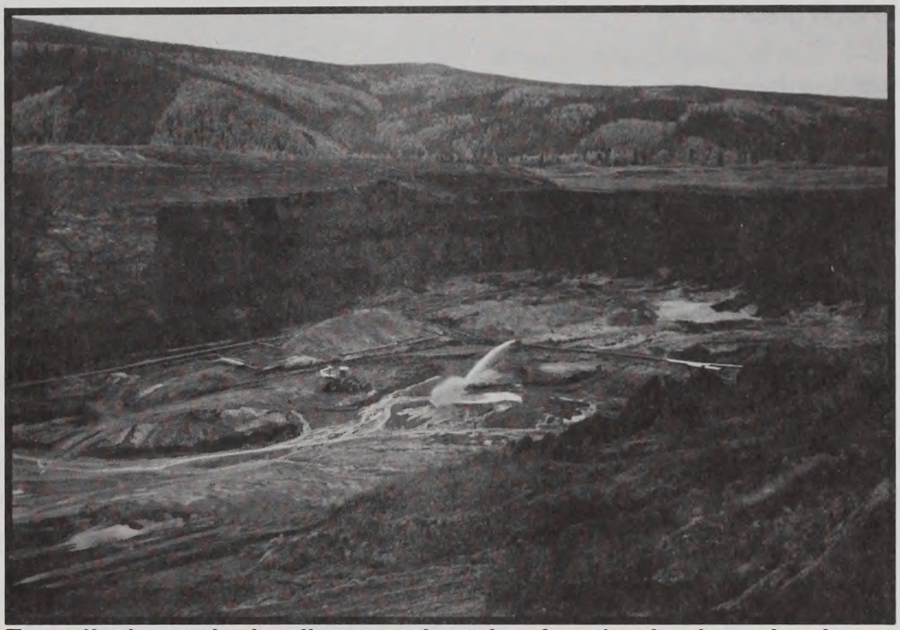
The water that carries the gold-bearing gravel through the sluice box becomes sediment laden and turbid. This "muddy" process water flows from the end of the sluice box through a pile of deposited tailings and into a series of settling ponds. These ponds are designed to hold the "muddy" water long enough to allow the fine sediments to settle out. A limited volume of process wastewater as defined by EPA may be discharged to the adjacent stream. The physical requirements of the ponds are dependent upon the amount of water flowing through the system, the sediment characteristics of the gravels being worked, and the physical characteristics of the site. Most mines utilize a series of small settling ponds to permit flexible water management. Small ponds are usually easier to build, repair, clean, replace, bypass, and rehabilitate. The use of "pre-settling ponds" is encouraged. A pre-settling pond is located in the tailrace between the



A typical mining method and reclamation process.

sluice and the first settling pond. Sands and other heavy settleable solids are collected here where they are easy to separate.

Settling ponds also treat sediment-laden surface water from excavated or stripped areas that would otherwise pollute "clean" surface and runoff water. Another water management practice is to divert clean runoff or ground water around the operation and into an adjacent stream or bypass. This minimizes the amount of clean water that flows into the settling ponds. These water management practices are commonly practiced by most operators. If these practices are not used by the operator's own initiative, they may be suggested as a mitigating measure to improve mine effluent treatment efficiency.


Zero discharge hydraulic operation showing depth of overburden.

Some mines in the Fortymile River drainage operate with a "no discharge" water management system. The term "no discharge" or zero discharge, is defined as no release of water back into a stream either through a pipe, an overflow, or by visible seepage through a dome or tailings filter. Underground flow is considered a discharge if the water quality in the stream is measurable affected. However, some zero discharge systems do have occasional discharges, usually due to water seepage through pond dikes. This seepage almost always meets the settleable solids effluent standards, and in most cases, is probably of better quality than the water discharged from typically operated settling ponds, i.e., less settleable solids and lower turbidity. Carefully designed and implemented water management practices are required to achieve zero discharge of "muddy" water into adjacent streams. Water used in the sluicing process is pumped from the nearby stream through the washplant and into the settling ponds. Water intake from the stream is suspended when the ponds contain adequate water to support continued sluicing operations by recycling pond water to the washplant. In some cases, groundwater seepage into the settling ponds may be sufficient to eliminate the need for adding stream water to the system. The practice of zero discharge and the recycling of mine water contributes to compliance with federal effluent limitations and State water quality standards.

For the typical placer mine on federal claims, reclamation begins upon completion of the final mine cut or at the end of the mining season. If mining has been completed at the location, tailings

are moved into the mine cut and the site is leveled or reshaped. The leveled tailings are then covered with available overburden and topsoil. These actions are usually completed with a bulldozer. Settling ponds may be reclaimed by stopping water inflow and allowing the ponds to drain. Tailings are then pushed over the ponds to contain the captured settleable solids and armor the basins from future erosion. Overburden and topsoil, if available, are spread over the armored ponds as well. The reclaimed site is allowed to revegetate naturally.

If mining has not been completed at the location, the mine site is stabilized in preparation for the next mining season. Settling ponds that will be used in future operations are isolated from additional water inflow, while ponds of no further use are reclaimed as discussed above. Berms around ponds, stream bypasses, and the active mine site are reinforced, and equipment is moved to high ground.

Suction Dredging

Suction dredging is another mining method commonly used in this drainage. The suction dredging season generally is from mid June until late September. Commercial operators dredge between 60 and 90 days per season. Most large suction dredge operations employ one submerged operator and a person on the dredge. The submerged operator works in clear water upstream of the dredge. Suction is produced by pumping water through a nozzle at high pressure. The dredge sucks gravel, sand, and rocks off the river bottom and discharges the slurry into a sluicebox. A flexible plastic hose with an intake nozzle is directed at the riverbed deposition while the floating dredge trails downstream. The dredge works much like a vacuum cleaner as the operator moves the nozzle in a sweeping motion upstream. Large materials are worked around or moved aside by the submerged operator to avoid plugging the hose. Gravel and water are washed through a sluicebox on the dredge, and gold and black sand are concentrated in the riffles.

Suction dredges discharge tailings and process water directly into the live stream without water water treatment. A sediment plume may extend downstream 25-100 ft, but is quickly dissipated. Sand and cobbles are mixed and deposited on existing tailings, effectively reducing downstream migration of most settleable and suspended solids. For EPA regulatory purposes, most suction dredges fall into the category of "non-commercial mines", which are those that process less than 20 cubic yards per day. Tailings left by the dredge vary in width and height, and partially fill the cut where materials were removed by the nozzle. In most areas on the Fortymile River, dredgers work in deeper water where tailings are not visible, and are not exposed during low water. Suction dredge tailings are not reclaimed by the operator during or after operations. High water generally redistributes the tailings, usually within a year of dredging, depending on the frequency and severity of high water events.

Suction dredges are operated in open, moving water near the shore within the first 25% of the available water column's width, where the machine and the diving operator are surrounded by water. As water levels drop, dredging operations move toward midstream. Water levels, clarity, volume, and velocity dictate where and when the suction dredge can operate. The submerged dredge operator must have good visibility to mine efficiently and safely. Some areas can only be mined during periods of low water.

As the submerged operator follows the gold bearing deposit, depth of the cut, material size, sweep width, water depth, and velocity all control the total area worked. See Appendix E-4 for estimates of area and volume of riverbed materials processed by suction dredges. The high shore area below the vegetation line is usually dredged during breakup in June or other high water events. Mining above the vegetation line along the shore has occured in the past, but is currently reduced by dropping water levels and miner education. Some recreational miners visiting the river for a limited period may find water levels too high to mine the lower shorelands, and may resort to mining the upper shore and into the vegetation.

2.3.1 Actions Common to all Alternatives

Existing Laws and Regulations

Management actions which are applied to mining under all alternatives are those established by existing laws, regulations, or Fortymile National Wild and Scenic River Management Plan decisions (Sections 1.6-1.8). BLM provides overall management of placer mining on public lands under the 43 CFR 3809 surface management regulations. The Corps regulates the placement of dredged and/or fill material into waters of the United States, including wetlands, under regulations found at 33 CFR 320 et seq. Other agencies manage water quality, fish and game populations, and other resources under their corresponding laws and regulations.

Inspections and Bonding

BLM compliance officers conduct inspections of placer mining operations on federal claims. Currently, all operations are inspected at least once each year, and most are inspected at least once during the mining phase of the operation and once at the end of the season after site reclamation has been completed. The primary concern of the compliance inspector is that the miner is operating appropriately and that reclamation work is acceptable. During each compliance visit, an inspection record is completed that describes the inspector's observations of the operation. If any problems or violations exist at the mine site, the compliance inspector discusses them with the operator, sets a time frame for correction, and issues a notice of noncompliance, if necessary. The mine site is revisited to ensure that corrective actions have taken place.

Bonding of placer mine operators on federal claims is a management tool which is authorized by the surface management regulations in 43 CFR 3809.1-9. Bonding can ensure that a mine site is reclaimed to the satisfaction of the authorized officer. By Bureau policy, bonding of mining operations at the plan level is a discretionary action; however, bonding is required when an operator has established a record of noncompliance. "A record of noncompliance is established when an operator: a) fails to take necessary actions on a notice of noncompliance issued under an approved Plan, a previous Plan, or a notice, until enjoined in a proper court, or b) conducts operations other than casual use without submitting a Notice or acquiring an approved Plan and fails to file a Notice or a Plan until served a notice of noncompliance" (BLM Manual, DOI 1985). The bond amount is usually equal to the estimated cost for the BLM to complete adequate reclamation at the mine site.

Bonding of long-term camping permittees is a discretionary action that can be taken by the BLM authorized officer pursuant to 43 CFR 2920.7(g). "The authorized officer may require a bond or other security satisfactory to him/her to insure the fulfillment of the terms and conditions of the land use authorization." Past bonding efforts have been limited to extraordinary situations where the permittee exceeded terms of the permit by contributing to unnecessary damage of federal lands. The bond is used as security for additional rehabilitation measures attached to the permit and a guarantee against further damage.

Access

Access to the area is via the Taylor Highway, an improved gravel road. Mines are then accessed by unimproved gravel roads. Mining sites not located along gravel roads are accessed in the summer over existing four-wheel drive trails or by boating on the river. River access is possible at many locations along the Taylor Highway, and travel along much of the Fortymile River is possible by motor and float boats. The Taylor Highway and major mine access routes are shown on the Placer Mining Operations and Access Roads Map in Chapter Three.

Use of most overland access routes have factors limiting the amount of use. Most primitive trail use, by upland mine operators, is restricted to winter operations only, especially where heavy equipment is involved; transporting machinery generally occurs between November and April over snowpack. Trails receive occasional summer use by four-wheeled drive or all terrain vehicles but use is restricted by moisture related trail conditions. During the fall hunting season traffic increases over a large number of the trails due to the popularity of the area for caribou and moose hunting. The Fortymile River Management Plan, Action 1.5 states: "Off-road vehicle use, other than vehicles of less than 1,500 pounds GVW, will be prohibited without a permit or approved Plan of Operations."

Suction dredge operators access the Fortymile River primarily at the South Fork and Fortymile highway bridges. High water periods from mid to late June are used to move the majority of supplies for a season's work. Motorized boats provide access to State lands for suction dredge mining within the navigable river segments. The Fortymile National Wild and Scenic River Management Plan (DOI 1983), Action 1.6 states: "Existing use of motorized boats on scenic and recreational segments will be permitted without specific authorization. Motorized boats will not be permitted on non-navigable wild segments except under the provisions of 43 CFR 3809."

2.3.2 Proposed Action

The Proposed Action for this EIS is to manage mining on federal lands using existing water quality standards as managed by the appropriate agency, with enhanced reclamation standards as outlined in 43 CFR 3809. Analysis of the cumulative effects of this Proposed Action includes the past and projected future impacts from federal, State, and private mines, and other non- mining activities in the region.

Standards

The water quality performance standards of significance would be the current EPA effluent guidelines and ADEC water quality standards or the existing EPA/ADEC variance for the operation. The performance standards would be .2 ml/l of settleable solids, .05 mg/l arsenic, and 5 Nephelometric Turbidity Units (NTU) above natural conditions when the natural turbidity is 50 NTU or less, and not more than 10% increase in turbidity when the natural condition is more than 50 NTU, not to exceed a maximum increase of 25 NTU at the mine effluent discharge point (18 Alaska Administrative Code 70.020, ADEC 1987b). This detailed turbidity standard will be referred to throughout the EIS as the **5 NTU turbidity standard. The above water quality performance standards would apply to all mines, whether they are under federal, State, or private jurisdiction.**

An EPA variance, as considered in the water quality performance standards of the Proposed Action, would allow a mine operator with a valid National Pollution Discharge Elimination System (NPDES) permit to discharge effluent with a measured turbidity greater than the State standard of 5 NTU above natural background. NPDES permit conditions are assessed at the point of discharge, prior to entering the receiving stream. To obtain this variance, the miner would submit site-specific information to EPA for evaluation of the dilution capability of the receiving stream. This information would include low, medium, and high stream volumes and velocities, size of the stream drainage, annual rainfall, stream water quality, and expected effluent discharge volume. The variance in the turbidity limit of the effluent is then based on careful analysis of these factors.

The reclamation performance standards for mines on federal claims under the Proposed Action require stockpiled topsoil and/or overburden to the protected from erosion during the mining phase of the operation. At the time of reclamation, tailings would be reshaped to approximate the surrounding physiography and covered with the stockpiled topsoil and overburden. Fine sediments captured in settling ponds would be stabilized at the end of each mining season. If available quantities of topsoil are insufficient to promote adequate revegetation of the site, then the Authorized Officer (AO) may require that settleable solids captured in settling ponds be utilized for reclamation efforts. The diverted stream would be restored to approximate its premining characteristics in the floodplain, i.e., configuration, flow velocity, and hydraulic gradient unless the operator can demonstrate to the AO that the bypass or another configuration is more appropriate. Seeding and/or fertilizing may be required to accelerate natural succession of vegetation. The significant reclamation performance standards for mines on State and private lands under the Proposed Action require removed topsoil to be saved and protected from erosion and that tailings shall be graded at the close of each season to approximate the surrounding ground contours (State of Alaska 1988). The State established these standards through stipulations attached to their Miscellaneous Use Permit. See Appendix B-4 for a complete listing of the State's routine requirements for placer mining operations.

Action Scenario Under The Proposed Action

Mining operations that utilized zero discharge water treatment systems would probably stay with that treatment system. Some operators would probably try to utilize other systems, such as tailing

or tundra filtration, to meet the water quality standards, while a few large operations would use flocculation as a secondary water treatment technique. The remaining operations would probably receive EPA variances from the water quality standards and would treat mine effluent entirely through a simple settling process. Suction dredgers would be expected to operate in the same manner as during the 1987 mining season.

Reclamation activities for mines on federal claims under the Proposed Action would be to reshape tailings to approximate the surrounding topography and to respread overburden and available top-soil over the reshaped tailings. Settling ponds would be reclaimed as previously described. The collected sediments within the abandoned settling pond may be removed and redistributed over the tailings. The stream would be redirected into a channel that approximates the original stream channel. The new channel would be designed to have pools, riffles, and other natural features. The reclaimed site would be allowed to revegetate naturally; however, selective seeding, and fertilizing may be required to enhance revegetation.

2.3.3 Alternative A

This alternative would emphasize mining activity on federal claims as regulated by 43 CFR 3809 and the minimum actions needed to implement the regulations. These regulations identify guidelines for determining "unnecessary or undue" degradation to the environment" and for conducting reclamation. Under Alternative A, the same water quality standards would apply to all miners, and would be those in effect during 1987, except no variances would be authorized. The federal and State reclamation standards would essentially be identical. Figure 2-5 shows a comparison of the performance standards among the alternatives.

Standards

The water quality performance standards would be the standard of .2 ml/l settleable solids, .05 mg/l arsenic, and the 5 NTU turbidity standard when measured at the mine discharge point. No water quality variances would be incorporated in this alternative. Soils and stream channels would be stabilized, and natural restoration and revegetation would be allowed to proceed. All federal claims would meet these standards.

Action Scenario Under This Alternative

Alternative A would allow the discharge of mine effluent settleable solids of .2 ml/l with the 5 NTU turbidity standards; no EPA variances would be allowed. Most mines operating in the Fortymile River drainage probably did not meet the turbidity requirements during 1987 if they discharged mine effluent into the stream, unless they were granted a variance from EPA. It would be unlikely that most mines could discharge any mine effluent into the stream and meet turbidity standards without the expenditure of considerable effort and money for a complicated water treatment system. A few operators would be able to afford these systems (gel logs or other flocculation techniques are two types), but for the average-sized mine, it would be simpler and more cost-effective to operate by recycling mine water with no discharge into the stream, if possible. Suction dredging operations would not be affected by this alternative.

Performance standards for reclamation of fish and wildlife habitats, and soil and vegetation stabilization would be less restrictive to mining activities than those standards required by current practices. Under Alternative A, disturbed topsoil and overburden would be stabilized to prevent erosion into the watershed, but the redistribution of these materials over the tailings would not be required. Tailing piles and open mine cuts would be stabilized and reshaped, probably by levelling with a bulldozer. The site would be allowed to revegetate naturally. Any constructed stream bypass would be stabilized or reinforced to make it the permanent stream channel.

2.3.4 Alternative B

This alternative would combine the present federal reclamation standards from the 43 CFR 3809 regulations with emphasis on water quality standards established to meet management goals defined in the Fortymile National Wild and Scenic River Management Plan. Water quality standards would be the same as Alternative A and would apply to all mines. State reclamation standards would be the same ones described for the Proposed Action and Alternative A (Appendix B-4).

Standards

Water quality performance standards for all operations would be the standard of .2 ml/l settleable solids, .05 mg/l arsenic, and the 5 NTU turbidity standard when measured at the mine discharge point. Stabilization of soils and stream channels would be conducted during operations. After completion of mining on federal claims, the stockpiled material would be distributed over the reshaped mine site to facilitate natural revegetation. Stream bypasses would be stabilized. Operations on State and private lands would meet the same reclamation standards as described in Alternative A.

Action Scenario Under This Alternative

Performance standards for water quality, and mining actions to meet those standards, would be the same as those under Alternative A. Reclamation standards for operators on federal claims require that disturbed topsoil and overburden would be stabilized to prevent erosion and soil loss during operations. After completion of mining on a site, the stockpiled material would be redistributed over the reshaped mine site to facilitate natural revegetation. The State suggests, but does not require, that operators on State and private lands follow this standard. Any stream bypass would be stabilized to allow for natural recovery of the stream channel.

Mining methods similar to those described in the beginning of Section 2.3 used in the Fortymile River drainage in 1987, as discussed in the Proposed Action, could be used to achieve the standards outlined in this alternative. The reclamation performance standards under this alternative are similar to the standards for reclamation on federal claims in 1987. A design that results in zero discharge may be necessary to meet the water quality standards. Reclamation of the creek channels and disturbed areas, with redistribution of topsoil over reshaped tailings, would meet the standards of enhancing the natural recovery processes. Suction dredging operations would not be affected by this alternative.

2.3.5 Alternative C

This alternative focuses on strict standards, some of which were proposed or under discussion by EPA and other agencies during 1987 (EPA 1987a). All mining operations in the watershed would meet the proposed reclamation and water quality standards. There would not be different requirements for federal claims compared to State and private claims. Alternative C is the environmentally preferred alternative.

Standards

The discharge water quality performance standard for this alternative would be zero ml/l settleable solids, .05 mg/l arsenic, and turbidity of zero NTU above natural conditions. Reclamation standards would be the same as for the Proposed Action, except that they would apply to all mining activities in the watershed. These standards emphasize restoration of natural-appearing landscapes, rehabilitation of stream channels, and regrowth of native vegetation. All mining activities would be conducted to minimize impacts to wetlands and riparian zones.

Action Scenario Under This Alternative

Alternative C water quality performance standards would be more stringent than proposed in the Proposed Action or Alternatives A and B. Under this alternative, the miner would have two realistic options in choosing an appropriate water treatment method for the operation. These options would be: 1) to employ a chemical treatment system to reduce mine effluent settleable solids to zero and turbidity to acceptable levels, or 2) to not discharge any effluent to the stream. Suction dredging operations probably would not be affected by this alternative.

Given these choices, most operators in this drainage would probably choose a zero discharge operation because it is presently more reliable and more cost-effective than a chemical system. Chemical treatment systems employ technology which has thus far had only limited success for mining operations in Interior Alaska.

Reclamation activities would be the same as those required for federal operations in the Proposed Action. Reclamation may include the fertilizing and seeding or planting with native species. Operators would be required to rebuild the stream channel in the original floodplain. The creek would be designed to have pools, riffles, and other natural features to provide fish habitat. Fine materials from settling ponds may be removed and redistributed over the tailings. Access roads and camps would be designed and constructed to reduce impacts on wetlands (Corps wetland definition) and riparian zones. Actions of these types would be required on all mining operations, regardless of land status or size.

2.3.6 Alternative D

Alternative D (no federal mining) is the "no action" alternative defined by the District Court. Mining on State and private claims would be unaffected.

Performance standards for reclamation of fish and wildlife habitats, and soil and vegetation stabilization would be less restrictive to mining activities than those standards required by current practices. Under Alternative A, disturbed topsoil and overburden would be stabilized to prevent erosion into the watershed, but the redistribution of these materials over the tailings would not be required. Tailing piles and open mine cuts would be stabilized and reshaped, probably by leveling with a bulldozer. The site would be allowed to revegetate naturally. Any constructed stream bypass would be stabilized or reinforced to make it the permanent stream channel.

2.3.4 Alternative B

This alternative would combine the present federal reclamation standards from the 43 CFR 3809 regulations with emphasis on water quality standards established to meet management goals defined in the Fortymile National Wild and Scenic River Management Plan. Water quality standards would be the same as Alternative A and would apply to all mines. State reclamation standards would be the same ones described for the Proposed Action and Alternative A (Appendix B-4).

Standards

Water quality performance standards for all operations would be the standard of .2 ml/l settleable solids, .05 mg/l arsenic, and the 5 NTU turbidity standard when measured at the mine discharge point. Stabilization of soils and stream channels would be conducted during operations. After completion of mining on federal claims, the stockpiled material would be distributed over the reshaped mine site to facilitate natural revegetation. Stream bypasses would be stabilized. Operations on State and private lands would meet the same reclamation standards as described in Alternative A.

Action Scenario Under This Alternative

Performance standards for water quality, and mining actions to meet those standards, would be the same as those under Alternative A. Reclamation standards for operators on federal claims require that disturbed topsoil and overburden would be stabilized to prevent erosion and soil loss during operations. After completion of mining on a site, the stockpiled material would be redistributed over the reshaped mine site to facilitate natural revegetation. The State suggests, but does not require, that operators on State and private lands follow this standard. Any stream bypass would be stabilized to allow for natural recovery of the stream channel.

Mining methods similar to those described in the beginning of Section 2.3 used in the Fortymile River drainage in 1987, as discussed in the Proposed Action, could be used to achieve the standards outlined in this alternative. The reclamation performance standards under this alternative are similar to the standards for reclamation on federal claims in 1987. A design that results in zero discharge may be necessary to meet the water quality standards. Reclamation of the creek channels and disturbed areas, with redistribution of topsoil over reshaped tailings, would meet the standards of enhancing the natural recovery processes. Suction dredging operations would not be affected by this alternative.

2.3.5 Alternative C

This alternative focuses on strict standards, some of which were proposed or under discussion by EPA and other agencies during 1987 (EPA 1987a). All mining operations in the watershed would meet the proposed reclamation and water quality standards. There would not be different requirements for federal claims compared to State and private claims. Alternative C is the environmentally preferred alternative.

Standards

The discharge water quality performance standard for this alternative would be zero ml/l settleable solids, .05 mg/l arsenic, and turbidity of zero NTU above natural conditions. Reclamation standards would be the same as for the Proposed Action, except that they would apply to all mining activities in the watershed. These standards emphasize restoration of natural-appearing landscapes, rehabilitation of stream channels, and regrowth of native vegetation. All mining activities would be conducted to minimize impacts to wetlands and riparian zones.

Action Scenario Under This Alternative

Alternative C water quality performance standards would be more stringent than proposed in the Proposed Action or Alternatives A and B. Under this alternative, the miner would have two realistic options in choosing an appropriate water treatment method for the operation. These options would be: 1) to employ a chemical treatment system to reduce mine effluent settleable solids to zero and turbidity to acceptable levels, or 2) to not discharge any effluent to the stream. Suction dredging operations probably would not be affected by this alternative.

Given these choices, most operators in this drainage would probably choose a zero discharge operation because it is presently more reliable and more cost-effective than a chemical system. Chemical treatment systems employ technology which has thus far had only limited success for mining operations in Interior Alaska.

Reclamation activities would be the same as those required for federal operations in the Proposed Action. Reclamation may include the fertilizing and seeding or planting with native species. Operators would be required to rebuild the stream channel in the original floodplain. The creek would be designed to have pools, riffles, and other natural features to provide fish habitat. Fine materials from settling ponds may be removed and redistributed over the tailings. Access roads and camps would be designed and constructed to reduce impacts on wetlands (Corps wetland definition) and riparian zones. Actions of these types would be required on all mining operations, regardless of land status or size.

2.3.6 Alternative D

Alternative D (no federal mining) is the "no action" alternative defined by the District Court. Mining on State and private claims would be unaffected.

Standards

Under this alternative, no applications for Plans of Operations or Notices would be processed or approved by BLM. This action would violate current regulations (43 CFR 2091.1 for accepting applications, and 43 CFR 3809.1-6 for processing applications). This action would also violate the 1872 Mining Law which gives a mining claimant the right to operate subject to surface management regulations. Changes would be required in these regulations and laws to legally implement this alternative. Mines on State and private lands would continue to operate under standards for State operations described in the Proposed Action.

Validity examinations would be conducted for each properly filed federal mining claim, appraisals would be done, and the owners of valid claims would be compensated accordingly. Stabilization of surface disturbance that has occurred since 1980 would be required on all federal claims. Further restoration would be allowed to proceed by natural processes.

Action Scenario Under This Alternative

This alternative would require that mining cease on all federal claims within the watershed. BLM would conduct validity exams for all properly recorded claims, appraisal would be made, and the owners would be compensated for their interest in the claims. This would require Congressional appropriation of funds. Reclamation activities for State operations would be similar to those described under the Proposed Action. Federal claims disturbed after 1980 would be stabilized with minimal work, and reclamation would be allowed to proceed by natural processes.

2.3.7 Projected Mining

Evaluating cumulative impacts considers the past, present, and reasonably foreseeable future action. In this EIS, the past number of acres of disturbance has been calculated by BLM. Reports like that of Hagler, Bailly and Co. (1987) have summarized historical data of the Fortymile River drainage. The 1987 mining disturbance was calculated using BLM knowledge and field work, and resources such as the Annual Placer Mining Applications. The future is projected using the methodologies given in Appendix B-1. For the purpose of the present analysis, it must be realized that the actual interrelationships are complex and largely unknown. Cumulative impacts were evaluated with a simple additive model.

Figures 2-2, 2-3, and 2-4 were used to evaluate the present number of mines and to project the future number of mines and associated roads, disturbances, reclamation, and environmental impacts, and place placer mining in perspective as a use of public lands.

Figure 2-2 compares the number of mines in 1987 to the expected number in 1998 under each alternative.

Figure 2-3 is a reclamation and disturbance summary with present mining (1987) used as the baseline to compare the projected mining situation for each alternative. Figure 2-4 is a summary of the present (1987) miles of roads and trails and the number of miles of roads and trails

projected for each alternative. (see Appendix B-1 for methodology). Figure 2-5 shows a comparison of the performance standards between alternatives.

	1987	Projected 1998				
		Proposed Action	Alternative A	Alternative B	Alternative C	Alternative D
Federal Mines	19	23	20	20	18	0
State Mines	14	17	15	15	12	17
Total	33	40	35	35	30	17

Figure 2-2. Comparison of 1987 State and federal mines against projected 1998 State and Federal mines under the Proposed Action and the alternatives.

Pre-1981 Disturbance-1,050	1987	Projected 1998				
		Proposed Action	Alternative A	Alternative B	Alternative C	Alternative D
Federal Disturbance	118	529	460	460	414	0
State Disturbance	120	391	345	345	276	391
Total	238	920	805	805	690	391
Federal Reclamation	56	322	280	280	252	0
State Reclamation	5	238	210	210	168	238
Total	61	560	490	490	420	238

Figure 2-3. Comparison of 1987 State and federal mine disturbance and reclamation by acres against projected 1998 figures under the Proposed Action and the alternatives.

	1987		1998 PROJECTION									
			Proposed Action		Alternative A		Alternative B		Alternative C		Alternative D	
Jurisdiction	Roads	Trails	Roads	Trails	Roads	Trails	Roads	Trails	Roads	Trails	Roads	Trails
Federal	29.4	53.2	94.4	40.7	75.2	35.4	75.2	35.4	63.0	29.7	29.4	45.2
State/Priv.	13.3	6.2	24.8	5.6	21.6	4.9	21.6	4.9	18.1	4.0	87.0	24.1
Joint	29.8	20.5	62.2	18.5	54.1	16.0	54.1	16.0	45.4	13.5	0*	0*
Total	72.5	79.9	181.4	64.8	150.9	56.3	150.9	56.3	126.6	47.2	116.4	69.3

*All joint trails become state/private roads and trails.

Figure 2-4. Comparison of various 1987 road/trail jurisdictions and projected 1998 jurisdictions by miles.

OPERATIONS	Proposed Action	Alt.A	Alt.B	Alt.C	Alt.D*
Water Discharge, including runoff	.2 ml/l, 5 NTU turbidity, EPA variances .05 mg/l arsenic	.2 ml/l, 5 NTU turbidity, EPA variances .05 mg/l arsenic	.2 ml/l, 5 NTU turbidity, EPA variances .05 mg/l arsenic	0 ml/l, 0 NTU turbidity, no variances .05 mg/l arsenic	.2 ml/l, 5 NTU turbidity, EPA variances .05 mg/l arsenic
In-stream channel ops.	no limits	no limits	no limits	Careful/ limited	no limits
Vegetation Stripping of area	no limits	no limits	no limits	no limits	no limits
Soils Topsoil	Save, stabilize against erosion	Stabilize against erosion	Save, stabilize against erosion	Save, stabilize against erosion	Save, stabilize against erosion
Shape of site	Stabilize to reduce erosion	Stabilize to reduce erosion	Stabilize to reduce erosion	Stabilize to reduce erosion	Stabilize to reduce erosion

RECLAMATION

Water Creek configuration	Reestablish grade & configuration in floodplain	Remain in bypass	Remain in bypass	Reestablish grade & configuration in floodplain	Remain in bypass
Fish habitat	Provide for fish passage: comply with ADF&G regs. rebuild as appropriate	Provide for fish passage: comply with ADF&G regs.	Provide for fish passage: comply with ADF&G regs.	Provide for fish passage: comply with ADF&G regs.	Provide for fish passage: comply with ADF&G regs.
Soils Shape of site	Reshape to approximate surrounding physiography	Stabilize to reduce erosion	Reshape to approximate surrounding physiography	Reshape to approximate surrounding physiography	Reshape to approximate surrounding contours
Fines-ponds	Protect from erosion, and respread as required	Protect from erosion	Protect from erosion	Respread over tailings	Protect from erosion
Topsoil	Respread over tailings	No requirements	Respread over tailings	Respread over tailings	No requirements
Vegetation Revegetation	Natural succession: fertilize & reseed w/native species as appropriate	Natural succession	Natural succession	Fertilize & reseed w/ native species	Natural succession

*These are standards for State operations, as outlined in Appendix B-4.
No federal claims would be operating.

Figure 2-5. Comparison of the Alternatives.

2.4 Alternatives Considered, But Eliminated From Further Analysis

During the scoping process, many alternatives were suggested that were considered for analysis but not selected for further study:

1) **No Action under NEPA.** BLM would take no action, in either accepting or approving Plans of Operations. This alternative would not be legal under current regulations (43 CFR 2091.1 for accepting applications in 43 CFR 3809.1-6 for processing applications). These regulations require BLM to make a decision on Plans, in most cases, within 90 days of receipt.

2) **Setting thresholds of maximum water pollution and unreclaimed surface disturbance for a basin, or different levels for subbasins of a drainage.** The number of mines in a drainage would be limited, based on these thresholds. This would be a concept similar to that being considered by the National Park Service under their Alternatives B and C (NPS 1988). This alternative is not considered viable for the following reasons:

a) The authority of BLM under FLPMA is less extensive than that of the NPS under the Mining in the Parks Act of 1976 (43 USC 1901). BLM is mandated to either approve Plans of Operations as submitted, or work with the operator to develop measures to prevent unnecessary or undue degradation of federal land (43 CFR 3809.1-5(5). If the Plan is considered to have activities with excessive impact, BLM will return the Plan to the operator and work with them to revise the operation. After the revised Plan is deemed sufficient to avoid unnecessary or undue degradation to the environment which would be caused by a prudent operator, then the Plan is approved by BLM (43 CFR 3809.1-6 et seq.). This procedure is different from regulations of the NPS that require denial of a mining application if the action is deemed to adversely affect or significantly injure federal lands (36 CFR 9.10). This alternative would be illegal for BLM under current regulations.

b) It would be extremely difficult to determine the number of operations that would be working on a creek or in a basin early enough to allocate proportions of sediment load or acreage disturbed at the time of Plan approval. Plans are received throughout the winter, spring, and into the summer months. With a required 30 day turnaround, (this can be extended up to an additional 60 days, if conditions warrant, for a total of 90 days, many Plans would be processed before others would be received. In addition, one stream often has operators working State claims, federal claims, and private mines in the same drainage. Again, it would be difficult to determine the number of operations that would be working on a drainage in any given season.

3) **Various levels of BLM enforcement, including compliance visits and administration of Plans of Operation applications.**

Various levels of enforcement have been included in evaluating the alternatives.

4) Requiring specific mining and reclamation methods.

This range of alternatives was not selected for three reasons: 1) The variation in the natural and mineral-bearing characteristics of the mining areas requires site-specific methods. Limiting all operations to a predetermined set of mining methods would reduce flexibility, and could increase environmental impacts. 2) Mining and reclamation technology is in a state of development and transition. Specific methods would rapidly become out of date and limiting. Emerging technologies are generally better both for mineral recovery and for environmental reclamation, and requiring static technology would restrict both activities. 3) These types of factors receive site- specific consideration in the preparation of EA's required for each Plan of Operations.

5) Changes in regulations and standards by other agencies.

This idea was partially used in Alternative C. The changes in standards are limited to those that were actually being proposed by EPA or being discussed by other agencies at the time BLM developed the alternatives from July to November, 1987. Other changes were not incorporated because other agencies are mandated with those tasks, and these standards are outside immediate BLM jurisdiction.

6) Various alternatives which result in less restrictive standards, especially for water quality.

Water quality alternatives are developed from existing and proposed agency standards. This EIS will calculate the cumulative effects of these standards, and BLM's posture is to require the operator to comply with all existing State and federal water quality standards.

Pursuant to 33 USC 1371(c)(e), BLM may not impose effluent limitations that are different from those established by EPA and ADEC.

7) Alternatives that would redesignate Fortymile River, including removing the Wild, Scenic, or Recreational River status of the stream, or changing the drinking water standard to the industrial standard.

These alternatives were not used because they would require action by Congress or the State of Alaska. This was not considered to be a "reasonable" alternative for implementation at this time. This alternative was evaluated in the EIS for the D2 actions which designated Fortymile River as a National Wild, Scenic, and Recreation River (DOI 1974). The Wild, Scenic, and Recreational River status could be reconsidered as a separate action with an attendant EIS.

8) An alternative with no performance standards and no regulation.

This alternative was not used because it would essentially revisit the issue that the 43 CFR 3809 regulations were originally intended to address. The no regulation alternative is the "no action" alternative evaluated in the "EIS for Surface Management of Public Lands

Under the U.S. Mining Laws, 43 CFR 3809" (DOI 1980b). A variation of this alternative would set low performance standards, and issue miners a "license" to mine.

2.5 Summary of Environmental Consequences of the Alternatives

This section is a brief summary of the environmental consequences. See Chapter Four for further information and background.

Cumulative Impacts

The evaluation of cumulative impacts requires the integration of time, space, mining/non-mining and federal/non-federal actions In a complex and dynamic environment. This section summarizes the cumulative impacts of multiple placer mines and suction dredging in the Fortymile River watershed. The spatial aspect is covered by considering the impacts of multiple mining operations in the Fortymile River (Placer Mining Operations and Access Roads Map, Chapter Three). Time Is considered by evaluating the past, present, and reasonably foreseeable actions of placer mining. Past and present impacts are part of the existing environment, discussed in detail in Chapter Three, Affected Environment. The projected number of mines, acreages of disturbance, and miles of roads and trails were calculated using methods outlined in Appendix B-1, and are summarized in Figures 2-2, 2-3, and 2-4. Further details on future impacts are in Chapter Four, Environmental Consequences. Impacts from non-federal mines are included in the discussions of current environment and projected impacts. In particular, the impacts of Alternative D, no mining on federal claims, show the effects from mining on State and private lands. Non-mining actions are discussed in Chapters Three and Four as appropriate. Cumulative impacts are discussed in the "Special Considerations" sections of each resource in Chapter Four.

Figure 2-6, at the end of Chapter Two, illustrates the impacts by showing past, 1987, and projected 1998 impacts for the Proposed Action and each Alternative.

Projection of Mines

Forty mines (23 federal and 17 State and private mines) were projected to be operating in the Fortymile River drainage (primarily in Wade Creek, Walker Fork, Bullion and Hutchinson Creeks, and the vicinities of Chicken and Boundary) over the next ten years under the Proposed Action. This prediction of the number of mines expected to be operating in 1998 was based on an estimated gold price of $600 per ounce. This level of mining activity was projected so that the cumulative environmental effects of Increased mining activity within the drainage could be assessed.

Projecting the number of mines that would operate under Alternatives A, B, and C was based on the compliance costs of these alternatives as compared to the Proposed Action's compliance costs. The costs for federal mines are listed in Figure 4-7, and a comparison clearly Indicates that the estimated water treatment costs for Alternatives A, B, and C are significantly higher than those estimated for the Proposed Action. Due to these significant increases in compliance costs, BLM

estimated that there would be a reduction in the number of mines operating under these alternatives. Under Alternatives A and B, 35 mines (20 federal and 15 State and private mines) were estimated to be operating in 1998. Similarly, 30 mines (18 federal and 12 State and private mines) would operate under Alternative C due to additional increases in water treatment and reclamation costs. These reductions are discussed further in the following paragraph. Under Alternative D, no federal mines would be operating, while 17 State and private mines would be operating under the standards of Alternative A.

The water treatment costs cited in Figure 4-7 were taken from an EPA report (EPA 1987b) that analyzed the economic impact of effluent standards on the placer mining industry. In the EPA report, six water treatment technology options were outlined and their associated costs for Alaska were estimated. BLM reviewed these options and selected the three treatment technologies that came closest to meeting the various water quality standards of the Proposed Action and Alternatives A, B and C. It is anticipated that option two, a simple settling discharge system that consists of primary and secondary settling ponds would meet the water quality standards with an EPA variance for turbidity discharge, for the Proposed Action. Alternatives A and B, with water quality standards of .2 ml/l settleable solids and the 5 NTU turbidity standard, and no EPA variances, would require operating with no seepage of effluent to the stream, or the option four water treatment technology listed by EPA. EPA estimated that operating this water treatment system would reduce the operator's income by approximately 13%, so BLM reduced the number of mines that would operate by that same percentage. Alternative C, with water quality standards of zero ml/l settleable solids and zero NTU turbidity increase, would require operations comparable to the option 6c water treatment technology, including zero discharge, 100% recycle of process water, and flocculants. For this system, EPA estimated that the operator's income would be reduced by about

Early day gold panning. From the Mary Jane Fate collection, courtesy of the Alaska and Polar Regions Department Archives, University of Alaska, Fairbanks.

27%, so the number of mines was reduced by that percentage. The costs in Figure 4-7 are representative of a mine that processes 50,000 cubic yards per mining season.

A worst-case scenario to describe a level of placer mining more intense than expected was analyzed to predict those possible cumulative environmental impacts. This scenario could occur if unforeseeable circumstances caused this high level of activity, such as the value of gold increasing by several hundred percent. The summary for this analysis is presented in Figure B-1 and the assumptions are listed in Appendix B-2.

2.5.1 Proposed Action

The effects of the Proposed Action are based on 40 mines (23 federal and 17 State and private) operating continuously for the next ten years.

There should be no major cumulative impacts on topography of public, State, and private lands. There would be some short- term modification of site aspect during mining which would not significantly impact the overall topographic setting of the affected area, since the required reclamation would include reconfiguration and stabilization. State and private lands would have some additional impacts on the topography since topsoil is not required to be respread over the reshaped site.

There should be no significant impacts on the availability of resources for mineral resource development.

The soil profile would be completely altered by mining operations on approximately 920 acres. Soil conditions may be impacted by access roads and trails through direct disturbance of the soil profile, enhanced erosion, or from compaction.

The impact of placer mining from federal non-point sources would result in some contribution to the sediment load of the stream system. However, this analysis indicates, with the possible exception of surface flow from large storms, that the downstream effect from non-point sources would be indistinguishable from expected natural conditions. Turbidity from non-point sources would probably continue under all mining alternatives, however, increases should be minimal with enforcement of EPA and ADEC water quality standards. Settleable and suspended sediments from effluent discharges (point sources) should also be minimal under the revised EPA effluent limitation guidelines. Up to 46 miles of stream channel may be mined and reclaimed.

The vegetation cover would be destroyed in mine and road areas. A short-term loss of productivity is unavoidable. Two hundred thirteen acres would regrow to a riparian tall shrub community within 25-30 years of reclamation, with an additional 325 acres of regrowth within 50 years on mining disturbance in creek bottoms. Five hundred forty acres of new mining disturbance would remain barren or sparsely vegetated.

There are no "listed" threatened or endangered plant species within the watershed; however, there are three "candidate" threatened or endangered species and three endemic species. The effects of mining and associated activities on these species are unknown.

Approximately 3,329 acres of wildlife habitat would be physically altered due to mining-related activities. Periodic disturbances to wildlife due to the operation of vehicles and machinery, and human habitation affecting 227,044 acres could result in a low to moderate level of short-term cumulative effects. The principal long-term adverse effect of mining would be the unavoidable loss of approximately 920 acres of upland riparian habitat in the Wade Creek and Walker Fork drainages, the vicinity of Chicken, and other areas for a 25 to 30-year period. The long-term cumulative loss of habitat to federal (310 acres) and State and private (230 acres) mining activities in these areas would probably contribute to a low to moderate reduction in moose population potential. The potential exists for long-term cumulative adverse effects to wildlife if mining activity, suction dredging disturbances, and human use of the area increases greatly in crucial wildlife habitats.

There are two to five known peregrine falcon breeding pairs in the watershed. Various levels of protective measures would be required for any mining activity planned within 1 to 15 miles of these nests. No anticipated activities are within the boundaries set by the protective measures.

Physical alteration of streams and minimal increases in suspended sediments from mines would result in an unknown magnitude of impact on population levels of aquatic resources. Fish passage would be provided as required by the ADF&G. On federal claims, remining and reclamation of stream channels in old tailings would include rebuilding the stream channels and restoration of fish habitat. Approximately 46 total miles (26 federal, 20 State/private) of physical disturbance to streams would occur over the next 10 years. Stream-side habitat would be restored in 25-30 years through regrowth of riparian vegetation. The condition of fishery resources would remain similar to 1987 levels.

Cumulative impacts on cultural resources in the Fortymile River drainage do not appear to be significant.

Present village-based subsistence usage of the Fortymile River drainage is relatively limited, with Chicken the only community located within the area. While some subsistence hunting and trapping is done in the region, particularly along areas with roads, subsistence fishing appears to be virtually absent. This is because people from the Eagle, Northway, and Dot Lake areas utilize fish resources closer to their villages in the Yukon and Tanana River drainages. People from Chicken, in contrast, have a largely non-subsistence lifestyle, with most residents involved in mining. Food supplies are largely bought commercially and brought in via the Taylor Highway. Thus, while the cumulative effects of placer gold mining within the Fortymile River system have reduced the amount of habitat available for use by resident fish, the actual impact on subsistence usage has been minimal since utilization of these resources has not been particularly significant for much of the 20th century. Mining as it would occur under any of the alternatives, including the Proposed Action, would not be significantly disruptive to actual recent low subsistence usage levels in the drainage. Further, "mining at current levels and as currently practiced [in 1987] has little influence

on physical water parameters in the basin" (Dames and Moore 1988). Thus, there is no evidence that the cumulative effect of mining in the Fortymile drainage would cause a significant negative impact on water quality as related to subsistence.

Some motorized recreation activities would be enhanced by the 150% increase in road mileage over the next 10 years. However, trails available to small ORVs would decline by 19%. Floatboating use would probably remain at approximately the same level as in 1987 or increase as a function of an expanding State population and tourism.

Increased mining would increase the visual contrast with the natural landscape. Over a 10-year period, approximately 26% more acreage would be newly disturbed by mining activity. Reclamation would reduce visual impacts over the long-term.

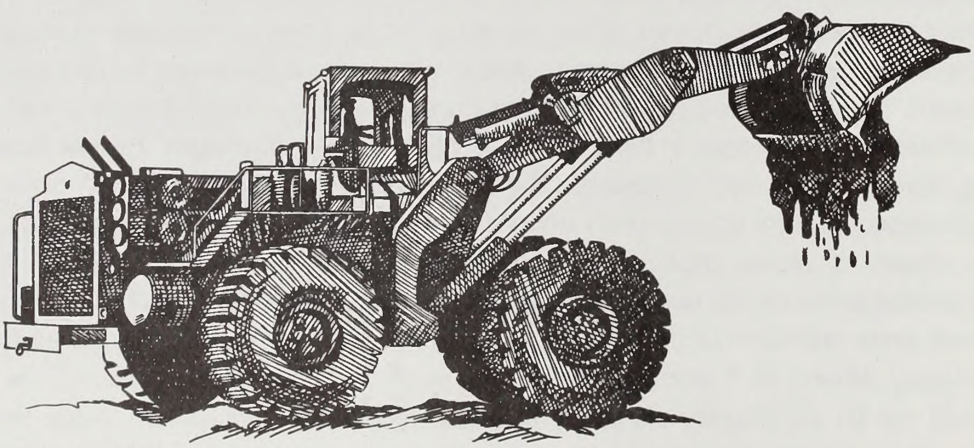
As the number of operating mines increases to 40, direct mining employment would increase over 1987 levels by an average of 28 workers, while over a 10-year period direct earnings would increase by approximately \$7.3 million and output would increase by approximately \$15.5 million. Total employment in the greater Fairbanks area would increase by 41 workers, earnings would increase by \$10.9 million, and output would increase by \$26.3 million. Local rural population within the Fortymile River drainage would increase by about 40 people.

Annual costs for water treatment and reclamation for all federal mining operations would be \$43,700 and \$78,200 respectively. Administration and enforcement of the surface management program for placer mining would cost BLM about \$59,800 annually (all values in 1987 dollars).

2.5.2 Alternative A

The effects of this alternative are based on 35 mines (20 federal and 15 State and private) which would operate continuously for the next ten years. The effects are the same as the Proposed Action except for the following differences.

The soil profile would be completely altered by mining operations on approximately 805 acres of ground.



Front-end Loader

Water quality would improve over the Proposed Action due to standards with no variances to the 5 NTU turbidity and the .2 ml/l settleable solids standards. There may be slight increases from non-point sedimentation due to less effective revegetation. Forty miles of stream channel are estimated for mining and stabilization into bypasses.

The vegetation cover would be destroyed in the areas of the mines and roads. A short-term loss of productivity would be unavoidable. One hundred acres would regrow to a riparian tall shrub community within 30 years of reclamation, and an additional 218 acres would regrow within 50 years on mining disturbance in creek bottoms. Six hundred forty-four acres of new mining disturbance would remain barren or sparsely vegetated.

Approximately 3,073 acres of wildlife habitat would be physically altered due to mining-related activities. Periodic disturbances to wildlife due to the operation of vehicles and machinery, and human habitation affecting 209,068 acres could result in a low to moderate level of short-term cumulative effects. The principal long-term adverse effect of mining would be the unavoidable loss of approximately 805 acres of upland riparian habitats in the Wade Creek and Walker Fork drainages, the vicinity of Chicken, and other areas for a 30 to 50-year period. The long-term cumulative loss of habitat to federal (368 acres) and State and private (276 acres) mining activities in these areas would probably contribute to a low to moderate reduction in moose population potential.

Impacts to invertebrate and fish populations from sediments would be somewhat less than under the Proposed Action due to no water quality variances. Long-term impacts to fish habitat from altered stream channels would be greater since this alternative requires bypass stabilization, but not restoration of the stream channel. Forty miles of stream channel are estimated for mining by 1998 under this alternative.

Some motorized recreation activities would be enhanced by the 108% increase in road mileage over the next 10 years. However, trails available to small ORVs would decline by 30%. Floatboating use would increase slightly compared to 1987 levels.

Increased mining would increase the visual contrast with the natural landscape. Over a 10-year period, approximately 32% more acreage would be newly disturbed by mining activity. Because reclamation requirements do not require reshaping tailings to resemble natural topography, or other measures to speed revegetation, many visual impacts would persist over the long-term.

As the number of operating mines increases to 35, direct mining employment would increase over 1987 levels by an average of 8 workers, while over a 10-year period direct earnings would increase by approximately $2.2 million and output would increase by approximately $4.5 million. Total employment in the greater Fairbanks area would increase by 12 workers, earnings would increase by $3.3 million, and output would increase by $7.7 million. Local rural population within the Fortymile River drainage would increase by about 10 people.

Annual costs for water treatment and reclamation for all federal mining operations would be $362,000 and $20,000 respectively. Administration and enforcement of the surface management program for placer mining would cost BLM about $28,000 annually (all values in 1987 dollars).

2.5.3 Alternative B

The effects of this alternative are based on 35 mines (20 federal and 15 State and private) which would operate continuously for the next ten years. The effects are the same as the Proposed Action except for the following differences.

Impacts on water quality would be similar to those under Alternative A with the exception of more effective revegetation and slightly less non-point source sedimentation.

One hundred eighty-six acres would regrow to a riparian tall shrub community within 30 years of reclamation, with an additional 218 acres of regrowth within 50 years in mining disturbances in creek bottoms. Five hundred fifty-eight acres of new mining disturbance would remain barren or sparsely vegetated.

The long-term cumulative loss of habitat to federal (319 acres) and State and private (276 acres) mining activities in these areas would probably contribute to a low to moderate reduction in moose population potential.

Impacts to fish and invertebrate populations would be similar to those under Alternative A.

Under Alternative B, impacts to recreation would be identical to Alternative A, because impacts on road and trail mileage and on water quality would be identical.

Although Alternative B would disturb the same acreage as Alternative A, over the long-term visual impacts would be less because of the beneficial effect of more stringent reclamation requirements.

Economic impacts would be the same as with Alternative A.

Annual costs for water treatment and reclamation for all federal mining operations would be $362,000 and $44,000 respectively. Administration and enforcement of the surface management program for placer mining would cost BLM $37,400 annually (all values in 1987 dollars).

2.5.4 Alternative C

The effects of this alternative are based on 30 mines (18 federal and 12 State and private) operating continuously for the next ten years. The effects are the same as the Proposed Action except for the following differences.

The soil profile would be completely altered by mining operations on approximately 690 acres of ground.

Impacts to water quality would be less than the Proposed Action due to no variances, and the enhanced reclamation standards being applied to all upland operations in the watershed. Thirty-five miles of stream reaches are estimated for mining and reclamation by 1998.

One hundred sixty acres of disturbed ground would regrow to a riparian tall shrub community within 25-30 years of reclamation, with an additional 270 acres of regrowth within 50 years on mining disturbance in creek bottoms. Approximately 400 acres of new mining disturbance would remain barren or sparsely vegetated.

Approximately 2,805 acres of wildlife habitat would be physically altered due to mining-related activities. Periodic disturbances to wildlife due to the operation of vehicles and machinery, and human habitation affecting 172,002 acres could result in a low to moderate level of short-term cumulative effects. The principal long-term adverse effect of mining would be the unavoidable loss of approximately 690 acres of the moose winter range habitat in the Wade Creek and Walker Fork drainages, the vicinity of Chicken, and other areas for a 30 to 50-year period. The long-term cumulative loss of habitat to federal (243 acres) and State and private (162 acres) mining activities in these areas would probably contribute to a low to moderate reduction in moose population potential.

Impacts to fish and invertebrate populations would be less than under the Proposed Action. Sediment in the water column would be reduced, thus improving habitat. Reclamation of all stream channels after mining, and restoration of fish habitat would improve conditions over the long-term.

Some motorized recreation activities would be enhanced by the 75% increase in road mileage over the next 10 years. However, trails available to small ORVs would decline by 34%. Floatboating and associated uses would increase slightly compared to 1987 levels.

Increased mining would increase the visual contrast with the natural landscape. Over a 10-year period, approximately, 24% more acreage would be newly disturbed by mining activity. Reclamation would reduce visual impacts over the long-term.

As the number of operating mines decreases to 30, direct mining employment would decrease over 1987 levels by an average of 9 workers, while over a 10-year period direct earnings would decrease by approximately $2 million and output would decrease by approximately $1.4 million. Total employment in the greater Fairbanks area would decrease by 10-15 workers, earnings would decrease by $3 million, and output would decrease by $7.9 million. Local rural population within the Fortymile River drainage would decrease by about five people.

Annual costs for water treatment and reclamation for all federal mining operations would be $541,800 and $61,200 respectively. Administration and enforcement of the surface management program for placer mining would cost the BLM $39,000 annually (all values in 1987 dollars).

2.5.5 Alternative D

The effects of this alternative are based on 17 State and private mines operating continuously for the next ten years. There would be no further placer mining on federal claims. Effects under this alternative would be the same except for the following differences.

Cessation of mining on federal claims would end further short- and long-term impacts upon topography of the public lands. Mining activity on State and private lands would cause the same Impacts on topography as for Alternative A.

Gold resources would remain undeveloped on public lands.

Overall water quality would be somewhat better than the Proposed Action, due to fewer mines operating on the streams. Non-point sedimentation would be the same or less than the Proposed Action. Restoration of mined stream reaches would not be required. Approximately 20 additional miles of stream channel would be mined under this alternative.

Soils on public lands would not be further disturbed by mining. Mining on non-federal lands would disturb the soil profile on 391 acres.

There is a long-term unavoidable loss of over 1,750 acres of the vegetation cover in the area from historic mines and roads. Activity on State and private lands would result in 90 acres of tall shrubs regrowing within 30 to 50 years, and 187 additional acres regrown to tall shrubs in 50 years. Two hundred seventy-one acres would remain barren or sparsely vegetated from this mining.

Approximately 2,383 acres of upland riparian wildlife habitat would remain physically altered because of past mining and related activities in the Wade Creek and Walker Fork drainages, the vicinity of Chicken, and other areas. Continued mining on State and private lands would result in the physical alteration of 271 acres. Periodic disturbances to wildlife due to the operation of mining vehicles, machinery, and human habitation at State and private mines would result in 176,343 acres being subject to short-term adverse effects in localized areas during the mining season. The principal long-term adverse effect of past mining would be the unavoidable loss of approximately 391 acres for a 40 to 50-year period. The long-term cumulative loss of habitat to mining activities in these areas would probably contribute to a low to moderate reduction in moose population potential. The potential exists for long-term cumulative adverse effects to wildlife if State and private mining activity, suction dredging disturbance, and human use of the area increases greatly in crucial wildlife habitats.

Impacts to fish and invertebrate populations from sediment loading would be slightly less than the Proposed Action. Some fish habitat may be degraded or lost without the requirement for restoration of mined stream reaches. Approximately 20 miles of stream would be affected by mining by 1998.

Some motorized recreation activities would be enhanced by the 61% increase in road mileage over the next 10 years. Trails available to small ORVs would decline by 4%. Floatboating use would probably remain at approximately the same level as in 1987, or increase slightly.

Visual impacts to federal land would be reduced slightly due to cessation of mining and reclamation of post-1980 disturbances. Continued mining on State and private lands would increase the visual contrast with the natural landscape. Over a 10-year period, approximately 15% more acreage would be newly disturbed by mining activity. Most visual impacts would persist over the long-term, because reclamation requirements on State and private operations would be essentially the same as under Alternative A.

As the number of operating mines decreases to 17, direct mining employment would decrease over 1987 levels by an average of 59 workers, while over a 10-year period direct earnings would decrease by approximately $16.6 million and output would decrease by approximately $32.8 million. Total employment in the greater Fairbanks area would decrease by 91 workers, earnings would decrease by $25 million, and output would decrease by $55.8 million. Local rural population within the Fortymile River drainage would decrease by less than 90 people.

Validity exams on all properly filed federal claims would cost the BLM approximately $1,730,000 to complete, and the estimated net present value of all the federal claims within the watershed is between $10,380,000 and $289,775,000 (Appendix B-3).

Components	Past Pre-1981	Present 1987	Proposed Action 1998
Number of Mines Acreage Disturbed Acreage Reclaimed	Unknown 1,050 Unknown	33 238 61	40 920 560
Topography Minerals	NSI* NSI on development	Minimal impacts NSI on development	NSI NSI on development
Soils: -Acres of soil disturbed	1,050	238	920
Water Resources: -Channel morphology miles -Sediment load tons/day -Toxic substances	85 Unknown Unknown	4.75 Unknown Unknown	46 1,347 Unknown
Landcover: -Permanently barren from mining -Years to regrow to shrub community -Threatened & endangered plants	1,050 50 Unknown	190 50 NSI	540 25-35 NSI
Wildlife: -Acres of habitat subject to disturbance/disruption -Acres of habitat lost for x years -Acres of habitat physically altered -Threatened & endangered animals	Unknown Unknown 1,050 NSI	167,403 238 ac/30-50 yrs. 1,760 NSI	227,044 920 ac/25-30 yrs. 3,329 NSI
Aquatic fauna: -Fish populations - Miles of stream disturbance	Unknown 85	NSI 4.75	NSI 46
Cultural & paleontological resources	Mining created historical sites	No new sites discovered	No change in impacts
Subsistence	NSI	NSI	NSI
Recreation & visual resources -Estimated recreation use	Unknown	7,300 visitor days	Increased motorized use; fishing, boating similar to 1987 levels or increased slightly.
Economics: (direct + indirect) -Employment (workers) -Earnings ($000,000) -Output ($000,000)	Unknown Unknown Unknown	194 53.6 121.4	235 64.5 147.7

*NSI - No Significant Impacts

Figure 2-6. Comparison of pre-1981 impacts with those of the 1987 mining season and projected 1998 impacts under the Proposed Action and the alternatives.

Alternative A 1998	Alternative B 1998	Alternative C 1998	Alternative D 1998
35 805 490	35 805 490	30 690 420	17 391 230
Minimal impacts NSI on development	NSI NSI on development	NSI NSI on development	NSI No further mining on federal lands
805	805	690	391
40 Greater than PA Unknown	40 Greater than PA Less than Alt. A Unknown	35 Less than PA Unknown	20 Similar to PA Unknown
644 50 NSI	558 30-50 NSI	405 25-30 NSI	271 50 NSI
209,068 805 ac/30-50 yrs. 3,073 NSI	209,068 805 ac/30-50 yrs. 3,073 NSI	172,002 690 ac/25-50 yrs. 2,805 NSI	176,343 391 ac/40-50 yrs. 2,383 NSI
NSI 41	NSI 41	NSI 35	NSI 20
No change in impacts	No change in impacts	No change in impacts	No further impacts
NSI	NSI	NSI	NSI
General increase in use	General increase in use	General increase in use	General increase in use
206 56.9 129.1	206 56.9 129.1	179 50.6 113.9	103 28.6 65.6

Fortymile River

Chapter III
Affected Environment

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CHAPTER MAPS

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Introduction

This chapter profiles the environmental resources for the Fortymile National Wild and Scenic River drainage. It is not intended to be an encyclopedic description, rather it discusses the physical, biological, social, and economic materials and conditions that would change under the Implementation of the Proposed Action or an alternative, and thus may aid a reader In understanding the alternatives.

The relation of human activity to the physical elements of the environment Is expressed as changes in earth, water, flora, fauna, and the socioeconomic system. For each resource, the term "cumulative effects" probably has a special and sometimes unique meaning or usage. This chapter discusses the past and present Impacts to the environment. Chapter Four looks at the future under various alternatives and assesses the cumulative impacts of placer mining.

Three of the required elements (Areas of Critical Environmental Concern, farm land, and Wilderness) listed in Chapter One (Section 1.7) were not discussed or analyzed in this chapter because such resources do not exist within the affected area. A fourth element, air quality, Is only discussed here in the introduction.

There is currently no quantitative information on air quality for this watershed. Because industrial operations are limited to mining and there are no metropolitan centers in the area, it is assumed the only pollutant sources are fugitive dust from travel on gravel roads, forest fires, and localized smoke from cabins. Occasional large forest fires in Interior Alaska and Siberia can cause short-term air quality problems such as reduced visibility and discomfort over large areas. In general, however, the air quality in the area is assumed to be excellent, on observational evidence. Under all alternatives there are no anticipated long-term or cumulative impacts to the air quality in the area. Very localized deterioration of air quality will occur in the immediate vicinity of internal combustion engines employed by mining operations and other activities. Immediate dispersion of exhaust makes levels of pollution undetectable.

General Considerations and Interrelationships Among Geology, Soils, and Sediments

The intent of this section is to briefly consider those geologic properties and controlling processes that occur at or near the earth's surface. The set of processes collectively known as erosion involve the detachment and transport of materials from place to place on and adjacent to the land surface. These processes are active in different areas and at different rates, depending on such factors as the mechanical strength of materials, climatic conditions, local geology and topography, and vegetation.

Erosion includes both the movement of products by the transport agents, and their temporary or permanent deposition. Water, particularly streams, is the most important transport agent. The products of erosion are transported In streams as dissolved load, suspended sediment, and bedload. The stream gradient affects the transport velocity, size of materials transported, and the deposition characteristics. Sediment tends to accumulate downstream in lower gradient areas where the water velocity is much lower.

These natural processes have various effects. For example, continual natural erosion replenishes the stream gravels necessary for a viable fish habitat. However, some mining practices tend to accelerate erosion processes. Accelerated erosion is caused by exposure of soil and by loss of vegetation cover, with a resultant decrease in the ability of the soil substrate to naturally regenerate. Additionally, deposition of the eroded materials may occur in places where it is unwanted and/or in excessive volumes, especially in streams where it can adversely affect downstream resources and uses. Disturbance or removal of permafrost may locally enhance biological productivity, although such actions also encourage erosion.

Erosion may be divided into two general types: surface erosion and mass movement.

Surface erosion refers to the movement of individual soil particles in response to gravity and/or fluid flow. These processes are usually minor in vegetated or undisturbed lands, although storms or snowmelt runoff may overwhelm the ability of the land to accommodate the water and temporarily increase surface erosion. Surface erosion becomes important when land is disturbed either by nature (wildfires, landslides) or by human activities such as mining or road construction.

Mass movement is a general term for a group of processes by which a large volume of earth is moved at various rates of speed under the influence of gravity. Rates of occurrence and velocities are usually increased by the presence of a fluid. Mass movement is generally caused by long-term weathering and reduction of strength, but individual occurrences are usually triggered by environmental events such as heavy rainstorms. Under natural as well as disturbed conditions, mass movement processes are, in the short-term, the most significant means of erosion in terms of environmental considerations.

General Soil Properties

Soil characteristically consists of a layer of organic material underlain by several layers or "horizons" of mineral soil. The properties of each horizon vary as a result of the interplay of soil-forming factors, particularly climate, vegetation, and topography. These act on the parent material over time.

Weathering of rocks at the earth's surface is the first step in soil formation. Chemical weathering and physical weathering form the more stable clay minerals, concentrate iron and aluminum oxides, and release the major plant nutrients such as potassium, phosphorus, and sulfur. This contributes to the solute composition of the soil water, and ultimately of groundwater and streamwater.

Soil Physical Properties

Soil physical properties control the drainage and availability of nutrients, water, and air to the root zone, affecting both root growth and nutrient movements. Physical soil properties include texture, structure, and density. Texture refers to the relative abundance of sand, silt, and clay-sized particles in the soil, and is often used as an approximate indicator of potential vegetation productivity.

Structure is the spatial arrangement and bonding together of soil particles, and is important to drainage, aeration, and erosion resistance. Density refers to the soil's relative compactness, and is important to root distribution and water retention.

Vegetation and related soil biological processes are important to the development of soil physical properties. Development of soil organic matter contributes to water-holding capacity, maintains aggregate stability, and improves soil resistance to erosion. This organic matter is a main energy source for the micro- and macroorganisms that play an active role in controlling both chemical and physical soil properties. Any change in the quality or quantity of vegetation, air temperature, water regime, or a host of other environmental variables will cause a change in soil physical properties.

The most direct changes to physical properties caused by mining practices are probably compaction or change in the soil's bulk density, and direct disruption of the soil structure and changes in soil texture.

Soil Chemical Properties

Soils are generally composed of some 15 chemical elements. Of these, seven (iron, calcium, potassium, magnesium, phosphorus, sulfur, and manganese) are important plant nutrients derived from soil weathering. Soil chemical properties can be affected by any mining practice that tends to change the dissolved ionic composition of the soil water. Of particular concern are removal of nutrients or losses which exceed replenishment, as well as persistent changes to processes that control rates at which soil nutrients are made available to plants.

Soil Biological Properties

Soil biology generally refers to the organisms that inhabit the soil. Most contribute to beneficial processes such as weathering of parent material, soil aggregation, organic matter decomposition, nitrogen transformation and fixation, retention of other substances that would otherwise be lost by leaching, and protection of roots from pathogens.

Growth and activity of soil organisms are affected by water, temperature, aeration, acidity, food supply, and biological factors. In undisturbed lands, populations of soil organisms reach a dynamic equilibrium; seasonal changes occur, but annual populations are relatively stable. Major site disturbances upset this equilibrium. Human activities such as mining practices, as well as various natural events may affect these processes through physical soil disturbance and modification or removal of vegetation.

Sedimentation

A recent publication by Woodward-Clyde Consultants, prepared for the Fish and Wildlife Service (USFWS 1980) presents the results of a detailed five-year study of the effects of gravel removal (in many respects similar to many placer mining operations) from arctic and subarctic floodplains in Alaska. This work collected and analyzed data from 25 sites in terms of six disciplines: river hydrology and hydraulics, aquatic biology, terrestrial ecology, water quality, aesthetics, and geotechnical engineering. Some points brought out by this study which are of general relevance to the concerns of the present EIS include the following:

> "Sedimentation includes the processes of erosion, transportation, and deposition of sediment. These are complex processes related to sediment and water flow properties. Attempts to quantify these processes provided, at best, estimates of the quantity....
>
> "Sediment Size Distribution. An important factor influencing most sedimentation problems is the size distribution of the sediments. The typical descriptors of the size distribution of sediment are the median diameter and graduation coefficient of the material....
>
> "The median sediment size in the floodplain generally decreases in the downstream direction along a river. Thus, the median size may be cobbles in the headwaters and fine gravel near the mouth. However, the median size can significantly vary around this general average within a small area at a specified point along the river. This variation is a consequence of the variation in hydraulic forces from one point in the floodplain to another...
>
> "Channel Erosion. Channel erosion in rivers is generally considered to be either local erosion (scour) or degradation. Both result from an increase in the sediment transport capacity, or a decrease in the sediment load entering the area, or both.
>
> "Local scour is most commonly a result of local increases in velocity due to flow obstructions or contractions. The increased velocity increases sediment transport capacity. Degradation can result if the channel bed is steepened in a short reach by, for example, a meander cutoff. The sediment transport capacity would be increased through this reach causing erosion and a general upstream progression of the steepened slope.
>
> "The progressive erosion continues upstream until equilibrium is reached. In theory, equilibrium is reached when the slope is equal to the slope prior to the occurrence of the cutoff, which would require the steepened slope to migrate to the headwaters. In practice, the steepened slope is reduced during its upstream migration and gradually reaches an equilibrium condition. However, the degradation may extend over a long reach before equilibrium is achieved.
>
> "Sediment Transport. Sediment transport is the movement of sediments past a specific cross section of a river. The sediment may be transported as suspended load or bed load. Suspended load is sediment that is transported long distances suspended in the water column. Bed load is sediment that is transported by saltation (bouncing), or by rolling or sliding along the river bed. The sediment size distinction between bed load and suspended load varies with

variations in discharge. At low flows, assuming the sediments were available, silts and clays may be transported in suspension and sands and gravels transported as bed load. During floods, suspended load may include clays, silts, sands, and gravels, with cobbles and boulders transported as bed load. Often, the suspended load is assumed to include clays, silts, and sands and the bed load includes gravels, cobbles, and boulders....

"Changes in sediment transport due to gravel removal were difficult to evaluate. A few possible changes...were suggested by the sedimentary features in and around the material sites.... Long-term increases in suspended load were implied at sites with disturbed areas which contributed fine materials to the flow. Examples of such long-term increases were...access road degradation...(a) diversion dam..., and several sites with overburden piles or berms containing fine-grained materials. Similar increases in suspended load could occur from accelerated bank erosion at the site. Deposition of fine-grained sediments in several of the gravel removal areas was also observed. Sites with changes in suspended load showed no pattern with the physical site or gravel removal area characteristics.

"Apparent changes in bed load were observed at some sites in the form of gravel dunes or loose gravel deposits in and downstream from the gravel removal area. When these deposits occur in the gravel removal area, they could indicate the inability of the flow through the area to carry the sediment load delivered to it or generated within it. Deposition occurring downstream from the gravel removal area would imply that the flow through the area is sufficient to erode the loose gravel from the gravel removal area. It is possible that when these gravels reach the main channel they are transported in the form of another bed form or possibly in suspension. Bed load changes occurred most often at scraped sites in active and high-water channels, and in locations immediately adjacent to such channels.

"Ice jamming can occur during breakup when ice floes moving down the river are blocked, thereby blocking subsequent ice floes and eventually creating a surface dam to the flow of ice. Ice jams can cause scour due to increased velocity beneath the ice dam; they can also cause the water level to rise, resulting in increased flooding. Ice jams are normally caused by a constriction in the channel width or depth, a reduction in flow velocity, or man-made structures in the floodplain.

"Aufeis is defined as areas of ice which have developed by a sequence of events of overflowing water on top of the previous ice surface. The general mechanism for the growth of aufeis involves an increase in the hydrostatic pressure due to a reduced flow area; when the pressure exceeds the elevation of the ice surface, overflow onto this surface results and subsequently freezes. The overflow causes the pressure to decrease and ice surface elevation to increase. This sequence continues to repeat until the source water cannot produce sufficient pressure to exceed the elevation of the ice surface. Three requirements for the formation of aufeis are given by Carey (1973); 1) significant ground water or under-ice flow, 2) growth of ice to the channel bed or near the bed, and 3) subsurface constriction such as bedrock, less pervious soil, or permafrost."

The purpose of substantive mitigation and reclamation is to minimize harmful impacts, insofar as feasible, or any surface-disturbing activities, including placer mining operations. BLM management of such activities focuses on this. A BLM-Alaska technical publication (DOI 1987e), "Surface-Disturbing Activities in Alaska: A Guide to Technical Aspects of Mitigation and Reclamation" deals with this; the work presented by Woodward-Clyde (USFWS 1980) served as a very useful conceptual and data source for parts of this BLM report.

3.1 Geology and Topography

3.1.1 Introduction

The Fortymile River watershed study area lies principally within the Eagle and Tanacross quadrangles, as mapped at a scale of 1:250,000 by the U.S. Geological Survey (USGS).

Much of the following discussion is based on and/or has been freely excerpted from a number of key references, principally the results of investigations by the USGS since the turn of the century in this part of Alaska (cf. bibliography). These references include extensive lists of other published information, and should be consulted for this purpose as well as for more detailed discussion of the geology, topography, and mineral resources of the study area. Included for reference is a generalized version of the geologic scale (Appendix C-1).

3.1.2 Geology and Topography

The Fortymile River watershed study area is in eastern Interior Alaska, bounded to the east by the international border with Yukon Territory, Canada. The area is part of the Yukon-Tanana Upland physiographic province, a semi-mountainous region bounded by the Yukon and Tanana Rivers to the north and south, respectively. The watershed lies in an area of discontinuous groups of mountains which rise to various elevations above a fairly uniform plateau-like region which is some 3,000-5,000 feet above mean sea level (See Tributaries and Main Physical Features Map, Chapter One).

The upland is interrupted by the numerous valleys of the Fortymile River and its tributaries. The Fortymile River crosses the international border into Canada at an elevation of approximately 1,100 feet, and continues to its eventual confluence with the Yukon River northeast of Clinton Creek, Yukon Territory. The area is one of appreciable topographic relief. The highest mountain, Mount Eldridge, has an elevation of 6,250 feet, while other prominent peaks include Glacier Mountain (5,743 feet), Wallcut Mountain (5,593 feet), North Peak (5,232 feet), Mount Warbelow (5,553 feet), Diamond Mountain (5,107 feet), Taylor Mountain (5,059 feet), Ketchumstuk Mountain (5,002 feet), Mount Veta (5,825 feet), and Mount Fairplay (5,541 feet). The average level of ridge tops, however, is about 3,000-4,000 feet, so that the average local relief in the region is about 2,000 feet or greater. The present highlands have been created principally by differential erosion of an older land surface, with the areas underlain by granitic rocks proving to be somewhat more resistant. Hence, the latter areas are generally those of the greatest present elevation across the

region. Since these granitic rock terranes lack bedding or pronounced pervasive gneissic character, there is little dominant linear local control to subsequent erosion, and the trends of present ridges and stream courses are not markedly unidirectional. However, there are two rather prominent structural directions evident regionally in the courses of the streams, one about N. 60° W., the other N. 60° E. The former is roughly parallel to the course of the Yukon River from Eagle to Fort Yukon and also to the Tanana River from its head to its mouth; the latter trend is generally parallel to the course of the Yukon River from Fort Yukon downstream to and beyond its confluence with the Tanana River. These large-scale relationships indicate a very broad regional structural control of bedrock features and, hence, resultant erosional features such as trends of larger stream courses. Mertie (1938, p. 138) describes the Fortymile River as follows:

> "The Fortymile River and its tributaries drain practically all of the Fortymile district. The main river is formed by the confluence of the North and South Forks, which join in the central part of the district about 23 miles in an air line west of the international boundary,.... The North Fork has a generally southeasterly course, and about 21 miles northwest of its confluence with the South Fork it receives a large tributary from the west, known as the Middle Fork. The South Fork, on the other hand, is formed by the junction of the Dennison and Mosquito Forks and has an air-line length of only about 13 miles, flowing generally N. 20° E. within the area .... Mosquito Fork drains a large area west and southwest of the Fortymile district, and in a similar way Dennison Fork drains the country to the south. The two largest tributaries of the main Fortymile River, within the Fortymile district, are Canyon Creek, and O'Brien Creek. Canyon Creek heads against Walker Fork and flows northward to join the Fortymile River just below Bonanza Bar; but O'Brien Creek flows southward, emptying into the Fortymile River farther upstream. Similarly the South Fork of the Fortymile River has two important tributaries, of which one, known as Walker Fork, heads in Yukon Territory and flows westward. The other large tributary of the South Fork is Buckskin Creek, which lies between the North and Mosquito Forks and flows eastward, emptying into the South Fork downstream from Walker Fork."

Mertie (1937, pp. 29-31) further comments:

> "The main Fortymile River, the South Fork, and the North Fork for 10 or 15 miles above the main confluence are meandering streams that are deeply incised in canyons and cut bedrock on most of their riffles. Upstream from these meandering courses the tributaries are straighter and swifter but are still incised in deep valleys. Above these stretches, particularly in the tributaries that head against the Tanana River, these streams are sluggish and flow across aggraded headwater plains. The upper valleys of Dennison Fork and its tributaries are specially good examples of such headwater lowlands. The old erosion surface that once connected with these lowland areas continues downstream into the lower parts of the valley as a high terrace, the slope of which is much less than the present stream gradients in the lower valleys, so that it gradually increases in height above the river downstream. This old surface now forms the top of the canyon in the main Fortymile River, at 500 to 600 feet above the level of the river.... Remnants of still higher terraces and a well-marked system of lower terraces are also visible in this valley. The upper valleys of Dennison Fork and its tributaries are alluvial plains to the extreme headwaters, and these streams for the most part head in wide swampy divides. The distance from these headwater divides to the Tanana, as previously pointed out, is very short; but

the tributaries of the Tanana, heading against these same saddles, have narrow precipitous headwater valleys.

"The lower valley of the Fortymile River is easy to explain. The river consists essentially of entrenched meanders, inherited from an ancient valley that existed prior to the late regional uplift. This part of the valley is an excellent example of the rejuvenation of a stream valley that once was in adjustment to a mature topography. The upper valley of Dennison Fork, however, is distinctly anomalous, for it is surrounded by high mountains and yet has no steepened headwater gradients such as would be expected even in an area of mature topography. Moreover, this headwater drainage is entirely out of adjustment with the headwater tributaries of the Tanana, which, with their high gradients, are doubtless now in the process of extending their headwater valley to the north. The headwater gradients of the Dennison Fork must have been active mountain streams at the time when this drainage was extended southward so close to the Tanana; and conversely the headwater tributaries of the Tanana are likely to have been less actively eroding streams, in order to have permitted the Dennison Fork to extend its headwater drainage so far south.

"The western and northern tributaries of the Fortymile River show none of the anomalous features of the southern tributaries, but instead have valleys that are approximately in adjustment with the old erosion surface of the country. In general the valley floors are broader than that of the lower Fortymile, and it is apparent that the effects of the late rejuvenation have not yet progressed upstream into these upper valleys."

The study area is made up of a variety of bedrock types, related structurally in moderately complex fashion. Most of the area is underlain by Precambrian (?) and Paleozoic-age metamorphic rocks, gneiss and schist, derived from both sedimentary and igneous rock precursors, and minor crystalline limestone, as well as by felsic, mafic, and ultramafic igneous rocks of Paleozoic-Mesozoic-Cenozoic ages. Some of the felsic intrusive bodies are batholiths of appreciable size. Tertiary age sedimentary, volcanic, and volcaniclastic rocks occur in restricted local parts of the study area. This region, principally comprised of crystalline-metamorphic and igneous rocks, is part of a geologic complex which is situated between two large-scale structural features of regional extent and significance - the Tintina Fault Zone to the north, and the Denali Fault Zone to the south. Foster, et al. (1976, p. 4-5) describe this complex:

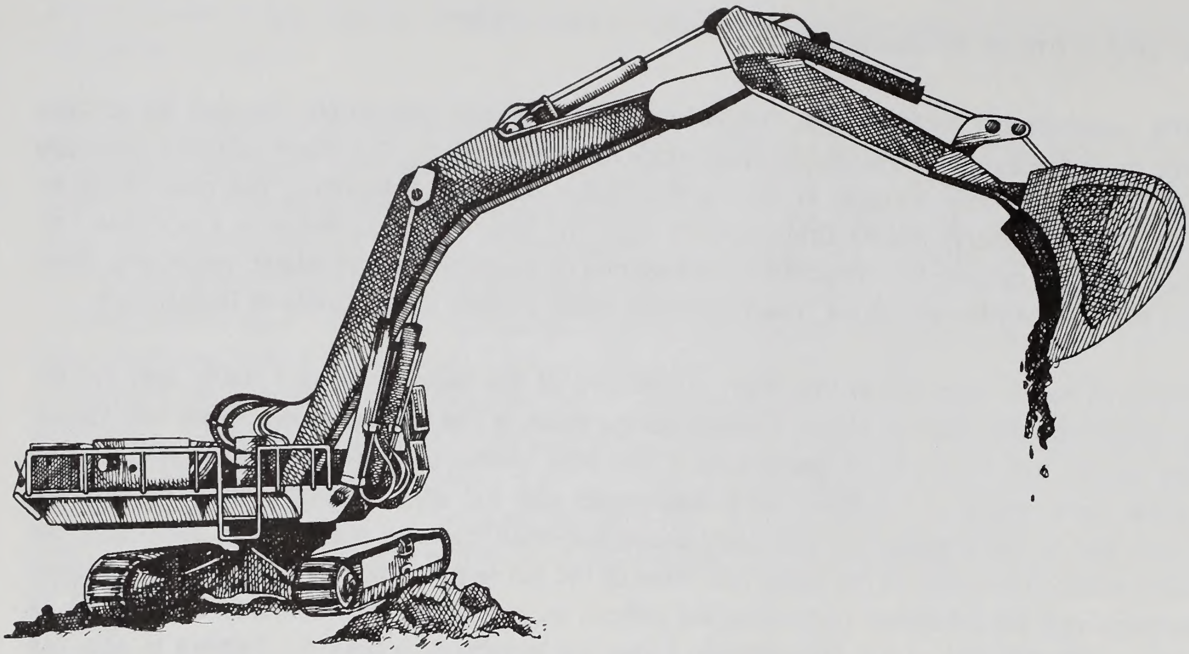
"These rocks are complexly folded and faulted, but little is known of their structural and metamorphic history. The number of metamorphic episodes, for example, is unknown. However, it is clear that regional metamorphism occurred before the emplacement of the Taylor Mountain batholith in late Triassic or Jurassic time, because well-foliated metamorphic rocks are incorporated in the nonfoliated granitic rock along the southern margin of the batholith. Foster and Keith (1974) have proposed that the entire metamorphic terrane is an allocthonous slice of continental material that has moved northward. Tempelman-Kluit, Gordey, and Reed (1976, p. 103-105) also postulate that the metamorphic terrane is allocthonous and suggest that it consists of a metamorphosed eugeosynclinal sequence that overlies an autocthonous miogeosynclinal succession."

Foster, et al. (1976, p. 4), also state:

> "The metamorphic rocks of the Yukon-Tanana Upland are extensively intruded by granitic plutons of mostly quartz monzonitic to granodioritic composition. The oldest intrusion, probably late Triassic or early Jurassic in age, is the Taylor Mountain batholith.... The other large intrusions are probably middle Cretaceous in age. The Mount Fairplay pluton is a complex Tertiary intrusion ranging in composition from syenite to granodiorite and quartz monzonite. Shallow felsic porphyritic intrusions, mostly hydrothermally altered, are probably of Tertiary age.
>
> "Volcanic rocks crop out in less than 10 percent of the quadrangle, but many may be associated with the igneous activity responsible for much of the mineralization. Felsic tuff, including welded tuff, is abundant, particularly in the area surrounding Mount Fairplay and on Sixtymile Butte. Some of the felsic tuff is associated with the shallow porphyritic felsic intrusive rocks and in most places so intimately associated that they are not mapped separately but were included together in the felsic tuff. Most of the tuff is hydrothermally altered, and original textures and compositions commonly are difficult to impossible to determine. Small areas of more mafic tuff also occur. The volcanic rocks are tentatively considered Tertiary in age, but some in the vicinity of Mount Fairplay may be of Cretaceous age. There are also several areas of basaltic volcanic rocks of probable Tertiary and Pleistocene age and, in addition, the very young Holocene volcanic cone, Prindle Volcano. Prindle Volcano is of special interest because peridotite and granulite inclusions occur in the basaltic lava (Foster et al. 1976).
>
> "The only sedimentary rocks present in the Tanacross quadrangle north of the Denali fault are nonmarine conglomerate, sandstone, shale, tuffaceous shale, and tuff of Late Cretaceous or early Tertiary age and Tertiary gravels that lie unconformably on metamorphic rocks (Foster 1967, p. B6)."

Although these upland areas are neither exceptionally high nor areally extensive, there is evidence of Pleistocene glaciation, particularly in the higher elevations. As summarized by Pewe et al. (1967):

> "The Yukon-Tanana Upland consists of an extensive area of rounded hills and ridges several thousand feet high. The higher mountains, comprised of granite and gneiss, and 4,000 to 6,700 feet in elevation, have been carved and steepened by glacial erosion.... No glaciers are present today, and although perennial snowbanks may exist on the higher mountains, none have been observed. Altiplanation terraces - large flat areas - occur in step-like fashion on ridges and mountain tops, at elevations slightly lower than the adjacent glacial cirques. Active solifluction is common on the slopes, and patterned ground is well developed on the altiplanation terraces. Permafrost is present in the valley bottoms and north-flowing slopes to depths as great as several hundred feet.... Cirques, U-shaped valleys, moraines, and outwash plains, all of two distinct geomorphic ages, indicate that at least two major alpine glaciations occurred in the Yukon-Tanana upland of Alaska. Although several hundred cirque and valley glaciers were present during each glaciation, only 3 to 5 percent of the upland was glaciated."



Excavator

During the Pleistocene large volumes of water discharged from these glaciers in the mountains caused modification of the topographic features at lower elevations, by erosion as well as deposition. Large amounts of outwash material, principally gravels, were deposited in low-lying areas, particularly along principal drainage courses. Some of these gravels contain economically valuable minerals, in particular gold. In some appropriate positions along the drainages natural concentrations of placer deposits were formed. Such deposits have been recognized throughout the study area. These outwash gravels of old floodplains subsequently were covered by reworked silt and organic materials.

The resultant topography is rather flat, the ground is poorly-drained and is presently at least partially frozen with visible ice-wedge features in many places. Such permafrost conditions are pervasive throughout the Yukon-Tanana Upland, since the entire Interior Alaska region is within the zone of discontinuous permafrost (Williams 1970). Specific relationships to permafrost in any given site depend on a complex array of geologic and topographic factors.

Mertie (1937) discusses the nature, distribution and origins of the various Pleistocene - Recent surficial deposits recognized within the Yukon-Tanana Upland:

> "...earliest Pleistocene deposits consist of silt, sand, and gravel ... These deposits occur in many different sites in the present valleys. Some of them lie 200 feet or more below the present surface.... Others occur on stream terraces, well above the present valley floors. At some places they lie deeply buried in old channels, separated from the present stream channels by bedrock reefs; and at other places the old and the new valleys have nearly the same courses, so that the present streams are now dissecting the older gravel. Many of the richer gold placers in the Yukon-Tanana region occur in these older deposits .... These older deposits

occur in all the principal mining areas of the region, including the Fairbanks, Hot Springs, Rampart, Circle, Seventymile, and Fortymile districts....

"After the deposition of the older Quaternary gravel there began, in this region, a different type of sedimentation. Most of the older gravel deposits are overlain by a varying thickness of silt, containing much vegetal material. This silt is black when wet but is light to dark gray after the moisture has been removed.... Some evidence leads to the belief that a considerable part of this material is wind-borne. At the top of such deposits, and locally in layers throughout them, the silt is mingled with much vegetal material, which gives it a black color; and locally beds of peat form a part of the sequence. These deposits of silt containing considerable vegetal material are called 'muck' by the miners; but because all the silt is dark- colored when wet the term 'muck' is loosely applied to all the dark-colored silts.

"These silt deposits, as well as the gravel below them, are usually frozen in whole or in part, in Interior Alaska. The silt, however, is much more likely to be solidly frozen than the gravel. It also contains beds and lenses of clear ice, practically free of sediment, which are believed in large part to have formed after the original deposition of this material. These beds of silt in some localities are only a few feet thick, but in other places, as in the Fairbanks district, they may have a thickness of 100 feet or more. The silt beds are not uniform in character throughout, for mining has shown the presence in them of inlaid lenses of grit or even gravel, showing that conditions of alluvial accumulations were by no means uniform, even at any one locality. Such deposits, overlying the older gold-bearing gravel, present one of the great difficulties of placer mining in Interior Alaska. The silt itself is practically barren of gold, and in order to reach the underlying placers this overburden must either be removed, or else underground mining methods must be utilized....

"The Recent alluvial deposits are composed mainly of gravel, sand, and silt. Much of the coarser debris has been eroded from bedrock sources and laid down by the present streams. The silt has been derived in considerable measure from the reworking of the older silt, although a certain proportion has also been deposited by recent streams. Certain solifluxional processes peculiar to sub-Arctic regions have also tended to produce fine sediments of this type....

"Stream detritus originates largely by mechanical and chemical weathering of the regional bedrock, but in Interior Alaska the relative importance of these methods is modified by local conditions. Chief among these are the low mean annual temperature and the vegetation. The mean annual temperature of the Yukon-Tanana region is about 9° below freezing, which alone is capable of producing a condition of permanent frost in the subsurface. In addition to this, the valley floor and sides and also the ridge tops up to an elevation of 3,000 feet are covered with a mantle of mosses and other vegetation, which act as an insulator and tend to prevent the summer heat from penetrating far into the frozen ground below. And these two conditions combine to produce a curious disposition of the local precipitation, for the frozen condition of the deeper ground prevents deep circulation of water, and the mosses prevent a rapid surface runoff of the rainwater. Therefore, the moisture is conserved in a spongelike mossy mat close to the surface, where it favors the growth of vegetation much denser than might be expected in a region where the annual precipitation is only 11 or 12 inches.

"The customary distinction between the water table and the zone of weathering above the water table is in this region hardly valid, for much of the subsurface water, where present, is frozen. Hence the solvent and depositional effects of circulating groundwater are almost lacking, and the chemical effects of oxygen and carbon dioxide are sharply restricted, because these reagents are not carried in solution. Chemical weathering, therefore, is much less important as an agent of weathering than in regions farther south.

"The surface of the ground in summer, however, is in a state of alternate thawing and freezing that produces marked mechanical weathering, due to the effects of frost heaving and related processes. The bedrock is loosened and fractured by the freezing and thawing of water, and an angular rubble that shows little oxidation is produced. This rubble tends to accumulate on the ridges as residual material. But the same thrusting forces that fracture and comminute the bedrock are also effective as a means of transportation, for the rock debris is thrust upward and laterally away from its place of origin and begins to move slowly down the hill slopes into the valleys below. Such moving sheets of alluvial material often develop characteristic flow lines along the sides of the valleys so that they resemble successive waves on a shallow body of water...

"Although chemical weathering in the headwater regions of the streams is sharply restricted, and mechanical weathering is seasonal, nevertheless the total amount of debris that is moved by the processes above outlined is remarkably great. It is not uncommon to observe sheets of such alluvial material impinging from both sides of a valley upon a headwater stream at a rate faster than the stream can transport the material downstream, so that the stream tends to flow in a narrow channel, sometimes several feet deep and only a foot or two wide; and in places the lateral debris has actually coalesced over the running water. This residual and semiresidual material is unsorted and includes rock fragments of all sizes, embedded in fine silt. Where the alluvial sheet has moved laterally a considerable distance from its place of origin to a drainage channel, the angular debris becomes rounded to a considerable degree. As soon as this material is exposed to the effects of running water, it begins to move downstream, the silt rather rapidly, especially in times of flood, and the larger rubble more slowly. From this stage onward, however, the erosional processes are essentially similar to those that prevail in more southern latitudes, and the results are essentially the same. The headwater gradients are normally steeper than the gradients of the lower valleys, and at some point or rather some zone in the valley stream action changes from transportation to deposition. As the regional relief is reduced and the headwater gradients are diminished, this zone of deposition moves upstream, thus developing progressively upstream a fluviatile gravel sheet. As the upper part of the gravel sheet is extended upstream, finer sediments cover the lower part, with the final result that the coarser and heavier sediments form the base of the alluvial section. The uniformity of this process is interrupted by floods, which carry coarse material farther downstream than it would ordinarily go and deposit it on top of finer material, thus resulting here and there in alternating beds of fine and coarse material. This general process of stream alluviation is also modified by local conditions....

Another condition that modifies the character of the Recent alluvial deposits is the effect of winter ice... In some of the smaller streams the ice increases greatly during the winter, both in

thickness and in area, as a result of overflows of water, acting under hydrostatic pressure from upstream. Such bodies of ice do not move downstream in the spring with the normal winter ice but are dissected by the streams and often remain as valley ice, or "aufeis," nearly all summer. Such deposits of aufeis also have the effect of widening valley floors, for in spring, when the water first begins to flow, channels may be cut along the sides of the ice, thus diverting the stream against the valley walls, and producing lateral erosion. Many stretches of wide flat valley floor in the tributaries of the Yukon have been produced in this manner, and it is quite possible that the same process, acting on a larger scale during the glacial epoch, may have been a powerful accessory factor in the development of the Yukon Flats."

3.2 Mineral Resources

The U.S. Geological Survey has investigated the geology and mineral resources potential of major portions of the study area as part of numerous studies in the Eagle and Tanacross quadrangles, while the State of Alaska has also carried out work in portions of the area (Saunders 1966, Smith 1968, Asher 1970).

Berg and Cobb (1967, pp. 221-222) summarize the mineral resources known in the Fortymile Mining District at that time as follows:

"The Fortymile district is known mainly for its placer gold deposits but also contains several lodes, none of which has shipped any ore. Most of the lodes are in metamorphic rocks near granitic contacts, and they typically consist of veins, or, less commonly, of irregular contact-metamorphic deposits carrying gold, silver, lead, copper, zinc, antimony, and iron.

"At the Tweeden prospect, in the basin of Mosquito Fork, small iron-stained quartz veins in greenstone and greenschist carry a little free gold.

"A gold prospect on Lilliwig Creek is in sericitized quartz diorite cut by numerous quartz-calcite veinlets carrying auriferous pyrite and minor chalcopyrite. Assays by the U.S. Geological Survey of selected sulfide-rich material from the prospect dump showed 1.87 ounces of gold and 2.05 ounces of silver per ton and 0.76 percent copper.

"A little work was done on a bornite-bearing lode at the Mitchell prospect, near the headwaters of Kechumstuk Creek, and possibly on other occurrences of copper minerals in the basin of the Middle Fork of Fortymile River, about 12 miles south of Joseph village.

"Two prospects on My Creek near Mount Veta are on calcite veins that cut Birch Creek Schist near the contact of granitic rocks. The veins contain argentiferous galena and minor amounts of sphalerite and malachite.

"A stibnite prospect in Birch Creek Schist is in a broad saddle on the ridge south of My Creek. Exploration at the prospect has been impeded by a cover of silt and muck, but about 4 tons of

material, estimated to contain 50 percent antimony, has been collected from exploratory pits and cuts. Stibnite has also been reported from the Norvill prospect in the Chicken Creek valley.

"A contact-metamorphic magnetite lode is in recrystallized limestone adjacent to granitic rocks at My Creek. It is 15 feet thick and can be traced on the surface for about 300 feet."

Additionally, asbestos deposits, at least one of which is large and of economic grade, have been recognized associated with ultramafic rocks in the Eagle quadrangle, and disseminated "porphyry-type" copper and molybdenum deposits have been recognized in the Tanacross quadrangle. Skarn copper deposits and stratiform copper deposits are known to exist in similar geologic environments in adjacent portions of Canada, and by analogy could reasonably be anticipated to occur in the study area as well.

3.2.1 Historic Mining

Arthur Harper is credited with the first gold discovery in the Fortymile River drainage around 1872. Other discoveries were made in 1882, but it was a 1886 discovery by Howard Franklin that started the gold rush into the Fortymile mining district. By 1888, placer miners were active at many locations in the drainage, particularly along the Walker Fork valley. In 1895, Jack Wade discovered gold on Wade Creek. There were about 600 miners working the Fortymile district at this time. Mining activity and gold production began to slump as miners were attracted to new discoveries in the Circle Mining District and on the Klondike River.

One and one-half tons of gold at the Alaska Commercial Co. store in Dawson, Canada, circa 1901. From the Lulu Fairbanks collection, courtesy of the Alaska and Polar Regions Department Archives, University of Alaska, Fairbanks.

Gold mining was interrupted during World War II, but small operators resumed in 1947 and dredging returned in 1954. The last of the large dredges, which was operating on Chicken Creek, shut down in 1967 and mining activity in general dwindled to low levels for the next ten years. Mining activity within the drainage and throughout the State was renewed in the late 1970's and early 1980's due to gold's increased value.

Cobb (1973), p. 132-136), discusses the mining of placer deposits of the study area in some detail.

> "The Fortymile is one of the oldest placer districts in Alaska. Gold was discovered in the Yukon Territory near the mouth of the Fortymile River in the fall of 1886 and in Alaska on Franklin Creek about a year later. In 1888, commercial gold placers were found at many other places, particularly in the valley of Walker Fork. By 1903, most of the productive deposits had been located. From the time of their discovery through 1961, placers in the Fortymile district were worked in every year, yielding a total of abut 417,000 ounces of gold, 2 percent of the total placer-gold production of Alaska. Data on production in most years since 1961 are not available, even though a large dredge operated on Chicken Creek through the end of the 1967 season. After this dredge shut down, only about half a dozen one-man operations were active.
>
> "Although practically every kind of placer-mining method has been used in the Fortymile district, most of the production was from dredges. The first dredges were installed on Walker Fork near the mouth of Twelvemile Creek and between the mouths of Davis and Poker Creeks in 1907. One of these was later moved to the South Fork of the Fortymile near the mouth of Uhler Creek. In 1934, a dredge was built on the upper part of Walker Fork near Boundary and was operated for several years before being abandoned near the mouth of Cherry Creek. In 1936, a dredge, fitted out with the machinery from the one that had operated near Franklin for many years, began digging on lower Wade Creek. It now lies abandoned about half a mile below the mouth of Ophelia Creek. Dredges were operated successfully in other parts of the district, including Canyon Creek, the Fortymile River near the international boundary, Poker Creek, the Mosquito Fork of the Fortymile at Atwater Bar, and, most recently, Chicken Creek. Dredging was unsuccessful at the Kink, an artificially cut off meander of the North Fork of the Fortymile River, although gold is present.
>
> "Mining by methods other than dredging has been carried on at Ben Creek, Gold Run, at most other localities..., and at many other places that are not well enough described to locate accurately. Of particular interest, though their total production probably was not statistically very important, are many bars of the Fortymile such as Claghorn and Bonanza Bars, where gravel is either very thin or missing entirely. Cleavage in the bedrock is nearly vertical and acts as natural riffles to concentrate gold which can then be recovered with simple equipment. These placers are self renewing, as each flood deposits new material from upstream, allowing them to be mined many times."
>
> "Both streams and bench placers have been mined in the Fortymile district. The most productive benches were those along upper Chicken Creek and its tributaries and at the head of and along the west side of neighboring Lost Chicken Creek. Mining, particularly in the early days,

was drifting in frozen parts of the bench gravels, but hydraulic and nonfloat methods also were used. An auriferous bench deposit that extends for several miles along the north wall of the valley of Dome Creek was mined by hydraulic methods in several places. Little Miller Creek, a small tributary of Dome Creek, cut through the bench and reconcentrated gold from the gravels, forming a very rich stream deposit that was mined out in the middle 1890's. Rich pay streaks were found in a bench on Napoleon Creek.

Cobb (1984) documents the occurrence of placer gold on 35 streams in the Fortymile district. These streams are:

Ben Creek	Gold Run (Creek)
Confederate (Coldfoot) Creek	Hutchinson Creek
Montana Creek	North Fork Fortymile River
Buckskin Creek	Fortyfive Gulch (Pup)
Chicken Creek	Dennison Fork
South Fork Fortymile River	Mosquito Fork
Ingle Creek	Lilliwig Creek
Lost Chicken Creek (Hill)	Myers Fork
Stonehouse Creek	Franklin Creek (Gulch)
Uhler Creek	Flat Creek
Twin Creek	Nugget Gulch
Dome Creek	Napoleon Creek
Gilliland Creek	Wade Creek
Twelvemile Creek	Walker Creek
Cherry Creek	Davis Creek
Poker Creek	Camp Creek
Canyon Creek	Squaw Creek
Woods Creek	

Mertie (1938) also discusses the "Gold Placers of the Fortymile, Eagle, and Circle Districts, Alaska," in detail. Mertie (1937) presents a discussion of placer deposits in general, as does Cook (1983).

Colp (1980) summarizes quantities and qualities of placer gold resources in his Bureau of Mines Open-File Report No. 43-80, "Fortymile Placer District Resource Inventory, Alaska." Data from Colp's report are summarized in Figure 3-1.

	Cubic Yards	Ounces
Portage Creek, Pittsburg Creek and its tributaries	2,100,000	45,000
Slate Creek, Ins Gulch, Jim Creek, Gold Run, Green, Ruby, and Ben Creeks	4,500,000	97,500
Bullion Creek	1,000,000	22,000
Hutchinson Creek	1,600,000	35,000
North Fork (Area known as "The Kink")	1,400,000	30,000
Mosquito Fork	3,450,000	74,000
Ingle Creek and its tributaries	360,000	7,500
Old Man Creek	420,000	8,200
Moose Creek	700,000	15,000
Gold Creek and its tributaries	2,100,000	45,000
Buckskin Creek	825,000	17,300
Fortymile Pup	1,200,000	24,000
Bench Across from Ingle Creek	680,000	14,300
Mosquito Fork	1,730,000	37,000
Chicken Creek, Stonehouse Creek, and its tributary at Myers Fork	700,000	15,500
Lost Chicken, Wall Street and Atwater Creeks	800,000	17,000
Wade and Ophelia Creeks	440,000	9,900
Walkers Fork and Liberty Creek	1,250,000	27,000
Napoleon Creek and its tributary	700,000	15,000
Franklin Creek	560,000	12,000
Buckskin Creek	1,130,000	24,000
Butte Creek	540,000	11,000
Uhler Creek	825,000	17,200
Benches on Napoleon, Chicken, Stonehouse Creeks, Myers Fork and on Lost Chicken Hill	1,950,000	42,000
Walker Fork and McKinley Creek	3,900,000	82,500
Twelvemile Creek and its tributary, Davis, Poker, Younger, Cherry, and Crow Creeks	1,400,000	29,700
Smith Creek	430,000	9,700
Canyon, Mariner, Iles Creeks, Squaw Gulch, Babe, Arkansas, and Brophy Creeks	2,800,000	59,000
Steele Creek	400,000	8,300
Wade, Gilliland, Grace, Warner, Robinson and Ophelia Creeks	700,000	15,000
Alder Creek	270,000	5,800
Flat Creek and its tributary, Twin Creek and its tributary, Nugget Creek, Discovery Creek and its tributary, Smith, Snow, Sam Patch, Moose and Alma Creek	2,700,000	59,000
Bench ground bordering the Fortymile River	1,100,000	23,700
Dome, Little Johnny, Georgie and Little Miller Creeks	1,800,000	38,500
Bench ground north of Dome Creek	2,500,000	51,700
O'Brien, Dime, King Solomon Creeks, and Liberty Fork	700,000	15,000
King Solomon Creek and Liberty Fork	1,100,000	23,000
Boundary Creek	1,200,000	26,000
American Creek, Teddy Fork, Nugget Gulch, Discovery Fork, Star Gulch, and Marion Creek	1,800,000	40,000
Mission and Small tributary	250,000	5,500
Mission and Colorado Creeks	820,000	16,000
Phoenix Creek	410,000	8,100
Big Boulder Creek	400,000	8,000
Rock Creek	60,000	1,200
Mission and Seward Creeks	680,000	14,000
Rock and Hudson Coulee Creeks	500,000	10,800
Bryant Creek	950,000	20,000
Mogul Creek	800,000	16,000
Gold Creek	200,000	4,000

Figure 3-1. Gold production in the study area. (Colp 1980)

	Cubic Yards	Ounces
Sonickson Creek	400,000	8,000
Barney Creek and tributaries	560,000	9,700
Barney Creek North Bench	660,000	14,000
Little Washington, Ruby and Bear Creeks	690,000	15,000
Broken Neck Creek	270,000	5,900
Crooked and Eldorado Creeks	800,000	17,000
Fox Creek, Lucky Gulch and Aurora Creek	820,000	17,200
Placer Creek	270,000	5,900
Nugget Creek	140,000	3,000
Alder Creek	550,000	11,500
Bonanza Creek	270,000	5,900
Flume Creek	550,000	11,500
Bench ground on Flume and Alder Creeks	390,000	8,200

Figure 3-1. (con't)

3.2.2 Recent Mining in the Study Area

Two complex issues confronting miners are compliance with State and EPA water quality standards. Two other issues affecting miners in the Fortymile River watershed are: 1) the permits the Corps issues, and 2) the outcome of pending litigation and this EIS.

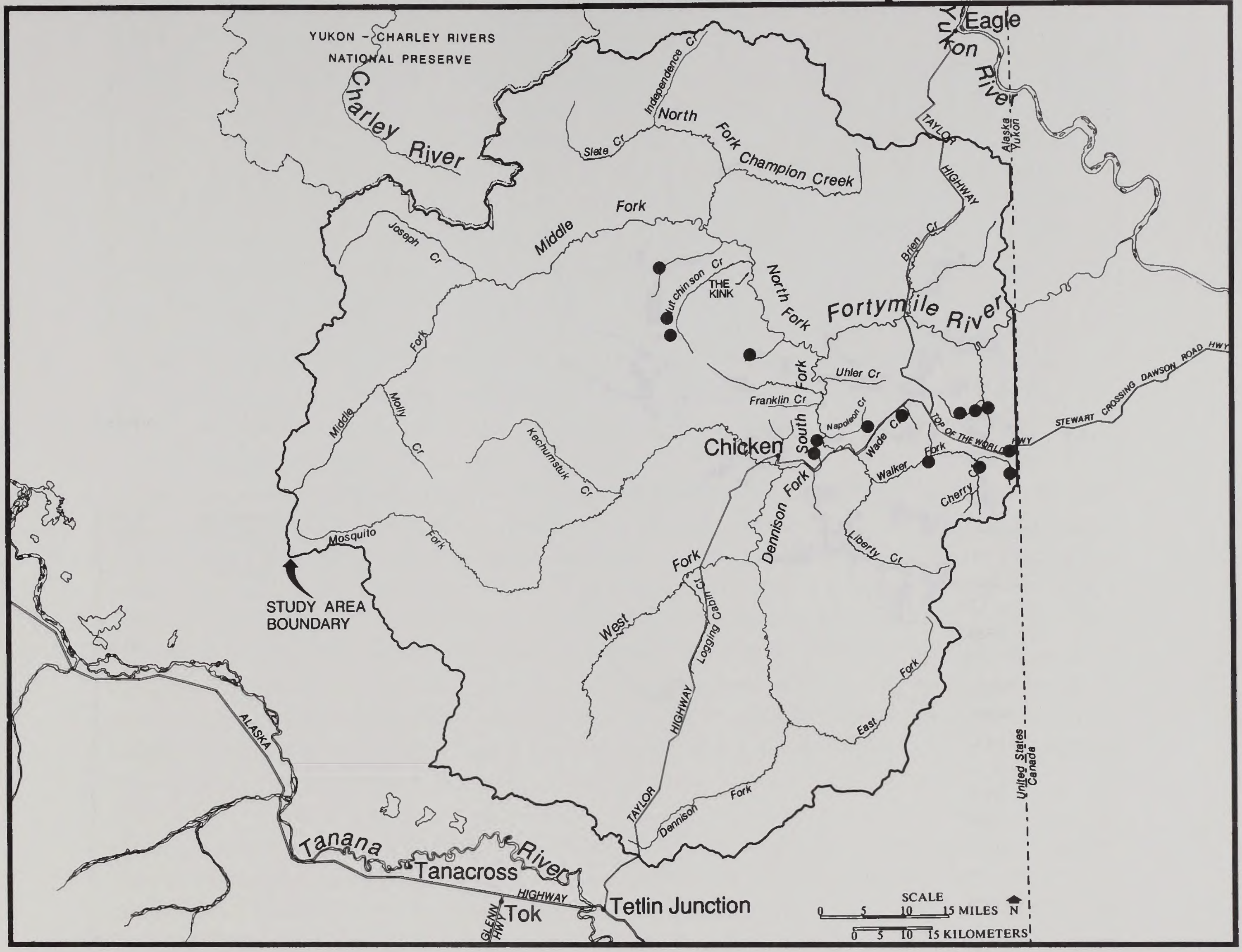
Water quality standards in some form have been in effect for placer mining for over ten years. EPA began issuing National Pollutant Discharge Elimination System (NPDES) permits in 1976 and has changed the permit requirements several times since then (Hagler, Bailly and Company 1987). Permits have required various mine effluent limitations for settleable solids and turbidity, and over the years requirements have become more stringent. Although water quality standards were in effect, enforcement of mining water discharge standards was nonexistent or minimal at best, and many miners operated without employing wastewater treatment techniques. By the early 1980's, it became obvious to the State of Alaska that water quality of mined streams was suffering and that the then current mining practices were not adequate to meet the water quality standards. To evaluate and attempt to resolve the problem, the Alaska Department of Environmental Conservation (ADEC) and other State agencies initiated numerous studies of placer mining's potential effects on the aquatic environment. They also sponsored projects to develop and field test wastewater treatment techniques.

One of the first field projects, a 1981 study on settling ponds, revealed that "the effluent from placer mines typically does not meet all State and federal water quality standards. The standards for turbidity and arsenic were almost never met and the standard for settleable solids was met with various degrees of success. The pH and temperature standards were met most of the time, and the standard for dissolved oxygen was met all the time" (ADEC 1982). Seven of the nine project mines with settling ponds met the settleable solids standards.

Follow-up studies and projects have shown that properly designed and operated settling ponds can effectively remove settleable solids, allowing compliance with the settleable solid standard. These studies have also shown that arsenic and mercury are effectively reduced to non-hazard-

Fortymile River Placer Mining FINAL Cumulative Environmental Impact Statement

Placer Mining Operations and Access Roads



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Federal 1987 Operations*

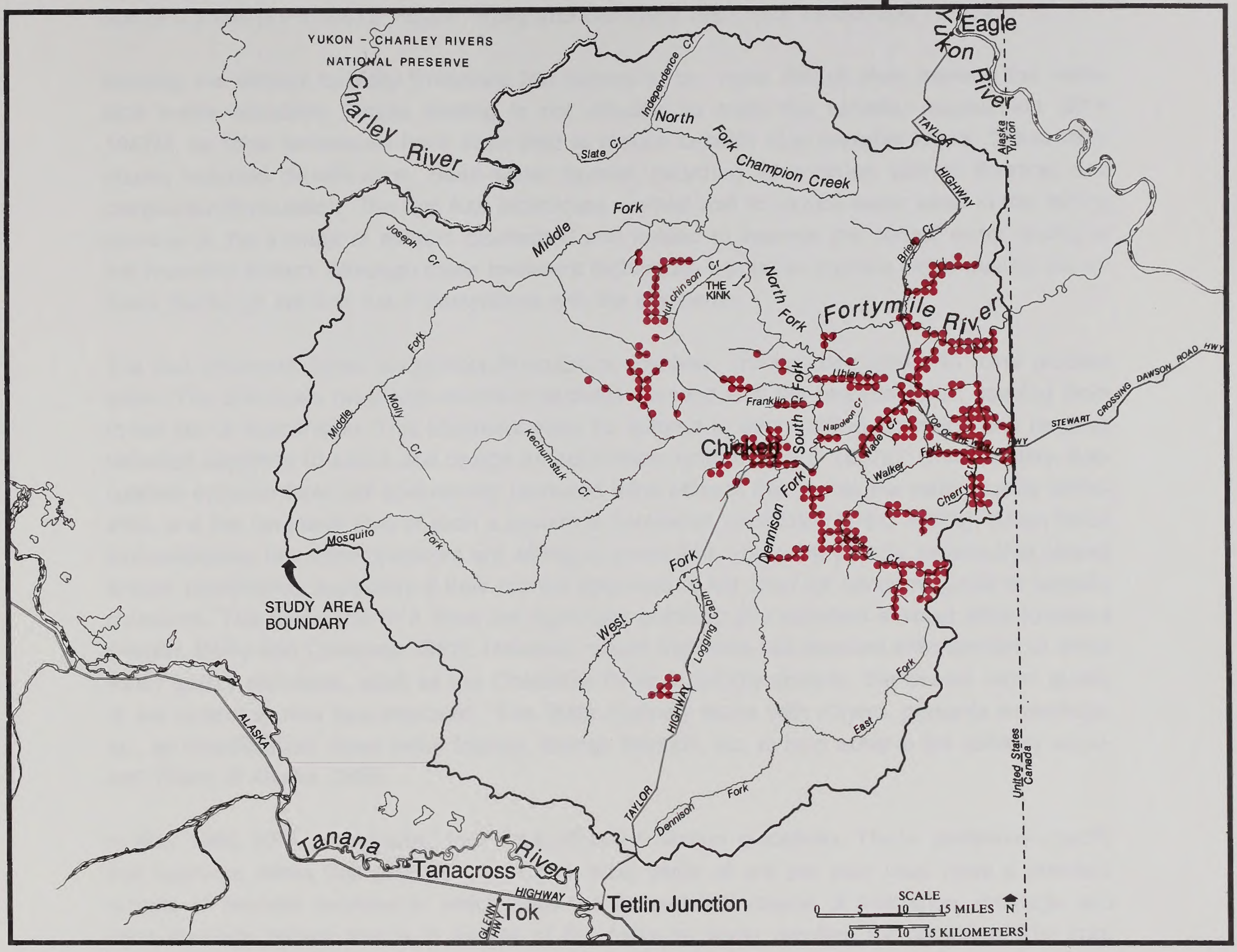
State 1987 Operations*

Roads and Trails

LOCATION MAP

*The operations depicted above include only those active State and Federal claims for which Annual Placer Mining Applications were filed for the 1987 field season.

Placer Claims



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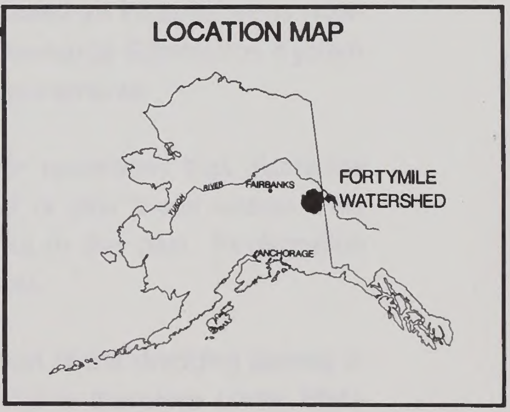
Federal placer claims shown active on BLM records, but not actually operating in 1987. One dot may represent more than one claim.



ous levels with simple settling of mine effluent (EPA 1987b). Miners began constructing and using ponds to treat their mine discharge water, and by 1987 most mines met the settleable solid limitation of 0.2 ml/l (EPA 1987b; Hagler, Bailly and Company 1987, DOI 1986b, and 1987b).

Meeting the effluent turbidity limitations has proved to be more difficult than meeting the settleable solids standard. Simple settling is not effective to meet the turbidity requirement (EPA 1987b), so other techniques have been tried to reduce turbidity to acceptable levels. These techniques included classification, clean water bypass, recycling mine water, tailings filtration, and coagulation/flocculation. The first four techniques worked well to reduce water used in the mining process or the amount of effluent discharged and helped to improve the overall water quality of the receiving stream. Although these treatment techniques helped to improve water quality, the effluent discharge still was not in compliance with the standards.

The last treatment listed, coagulation/flocculation, involves mixing chemicals with mine process water. The chemicals react with sediment particles suspended in the process water, causing them to fall out of suspension. This treatment must be tailored to each mining operation and requires technical expertise to select and design an application system (ADEC 1987a). Unfortunately, flocculation systems have not consistently produced mine effluent that meets the water quality standards, and the long-term cost of such a system is somewhat uncertain (ADEC 1987a). Given these circumstances, few mine operators are willing to invest time and money into a system that cannot ensure compliance, especially if their current operation is not cited for noncompliance of turbidity standards. The State and EPA have not rigorously enforced this standard at most mine locations (Hagler, Bailly and Company 1987). However, where the State has focused enforcement of these water quality standards, such as the Chatanika River (a priority stream), the overall water quality of the stream or river has improved. "The State routinely works with miners, presents workshops, etc. on classification, clean water bypass, tailings filtration, etc. to help achieve the turbidity standard" (State of Alaska 1988).

In May 1988, EPA promulgated their final effluent limitation guidelines. These guidelines specify that open-cut mines that process over 1,500 cubic yards of ore per year must have a resultant volume of process wastewater which does not exceed the volume of infiltration, drainage and mine drainage waters that is in excess of the make-up water required for operation. The concentration of pollutants in discharged process wastewater must not exceed an instantaneous maximum settleable solid limit of 0.2 ml/l. EPA issues National Pollution Discharge Elimination System (NPDES) permits, which must take into account State water quality requirements.

In 1988, the Corps began to require that miners obtain a permit for operations that discharge dredged or fill materials into waters and wetlands and/or that obstruct or alter these waters. This requirement is not new, but few miners have obtained these permits in the past. Reclamation standards may be similar to those currently required of federal operators.

Suction dredging for gold has become a major activity in the basin. Most of the dredging activity is concentrated along the road system on the navigable streambed, and is therefore under State management. However, the associated fuel caches and campsites tend to be on surrounding uplands managed by BLM. Camping with the intent to remain on BLM-managed lands within the

corridor for more than 10 days is prohibited without a written authorization from the authorized officer, such as a land use permit or an approved mining Plan of Operations on federal claims. The intent of this regulation is to avoid needless impacts to the river system caused by the establishment of large long-term camps without consideration of permit stipulations and requirements.

With the passage of ANILCA, Congress designated portions of the Fortymile River and its banks as a Wild and Scenic River (excluding State lands). The Wild and Scenic Rivers Act (WSRA) states "Each component of the national wild and scenic rivers system shall be administered in a manner as to protect and enhance the values which caused it to be included in said system...." Existing claims are managed subject to "valid existing rights;" any new mining activities (outside existing claims) on federal lands are limited, by law, to recreational mining and can be carefully regulated by BLM. (See Appendix C-2 for a description of the historical development of long-term camping permits and the concomitant effects of the lawsuit and enforcement.)

The present BLM (pre-lawsuit) policy is to locate camps above the ordinary high water mark where some screening by vegetation would minimize visual impacts and other impairments. In 1988, BLM was unable to issue long-term camping permits, and miners moved onto State ground and shore land below the ordinary high water mark.

The environment directly affected by suction dredging is primarily limited to navigable river segments as little dredging occurs on streams managed by BLM. The Wild and Scenic River corridor contains approximately 250,000 acres and 392 miles of designated streams. Navigable river segments include 22 miles classified as Wild and 68 miles of Scenic river. Navigable rivers, under State management, amount to approximately 90 river miles, or 23% of the Fortymile National Wild and Scenic River system. The total area of the navigable riverbed is estimated to be 2,806 acres.

3.2.3 Active Mines

Approximately 38 placer mining operations were proposed by operators within the Fortymile drainage and about 33 of those operations were active during the 1987 mining season. Twenty-four operations were proposed on federal claims, while remaining proposals were on State and patented claims. At least 18 federal operations were active during 1987. Six operations were proposed within the Wild and Scenic River Corridor. Annual Placer Mining Applications (APMA), 1987 BLM compliance reports, and discussions with BLM compliance inspectors were used in compiling the above and following statistics on mining activities in the Fortymile drainage during 1987 (ADNR 1987, DOI 1987b).

Most of the mines in the Fortymile River drainage operated with bulldozers and front-end loaders employing a mining method described in Chapter Two. A few mines used draglines to move overburden and to mine gold-bearing gravels. One mine used giants (nozzles that direct high-pressure water streams) to hydraulically strip overburden and move pay gravels. About one-third of the mining operations recycled some percentage of mine process water and at least three miners attempted to operate without any discharge of process water. One operator used a tundra filter to complete the treatment of mine process water.

Early Interior placer mining operation. Photo courtesy of Anchorage Museum of History and Art.

Monitoring observations in 1987 on Mosquito Fork, South Fork, and Forytmile River conclude that an estimated 34 individual suction dredges mined the riverbed. Suction dredge intake sizes ranged from three to twelve inches. Four suction dredge operators submitted APMAs. Much of the transient dredge uses is attributed to recreationists operating dredges for short-terms with intake sizes ranging from three to six inches. Recreationists operating in this class are not currently required to submit APMAs to the State for use on navigable river segments in the Fortymile drainage. An estimated population of 72 persons were associated with the dredges while 18 camping permits were issued to long-term suction dredge operators. The highest use of suction dredges occurred between the Mosquito Fork bridge and the confluence of South Fork and Walker Fork, approximately 13.1 river miles.

Most, if not all, the navigable riverbed has been claimed under State administrative rules. Each claim cannot be greater than 1,320 feet on a side and must run in an east-west or north-south direction. No minimum length or width is set, which creates difficulty in determining the number of possible claims in a given area. The width of riverbed claims is determined by the width of the bed between the ordinary high watermarks on either side of the river. A liberal interpretation of the above State requirement was used to extrapolate the number of possible claims that could be located on the bed of the navigable segments, which amounts to approximately 356 claims. This number of claims is not intended to reflect the number of State claims or claimants on record which varies from year to year. Currently between 10 and 15 State claimants hold all the

navigable riverbed claims for mining purposes. Appendix C-4 provides an overview of each navigable river segment estimating the number of claims and riverbed area.

All of the operations in the drainage collectively disturbed approximately 238 acres in 1987, of which about 118 acres can be attributed to operations mining on federal claims. Approximately half of the operations disturb five acres or less, while the remaining operations generally disturb greater than ten acres. About 60 acres of that total disturbance was reclaimed by the end of the mining season, about 90% of that acreage being on federal claims. Mines operated on at least 27 different creeks and segments of the Fortymile River, with the heaviest activity concentrated around the communities of Chicken and Boundary. Locations of the 1987 proposed operations and associated access are shown on the Placer Mining Operations Map. The general locations of active federal mining claims are shown on the Placer Claims Map.

3.3 Soils

There are four broad soil associations within the Fortymile River watershed (U.S. Soil Conservation Service 1979). These associations are only general descriptions of the specific soil types that may occur and have only been identified through interpretation of vegetation patterns from aerial photography. There may be considerable variation in the specific soil properties within each association. All of the soils in the area are cryogenic, or soils that have formed under cold conditions and show cold soil temperatures. Due to the seasonally cold temperatures, the entire Yukon - Tanana region is underlain by discontinuous, moderately thick to thin permafrost. Pewe (1982) describes permafrost as:

> "...naturally occurring material with a temperature colder than 32° F for at least two years. Permafrost is defined exclusively on the basis of temperature. Most permafrost is cemented by ice, but permafrost without water, and thus without ice, is termed dry permafrost. The upper surface of permafrost is known as the permafrost table. In permafrost areas, the layer of ground that freezes each winter and thaws each summer, called the active layer, varies in thickness according to its moisture content. Generally, this thickness is from one half to one foot in wet, organic sediments and up to six to nine feet in well- drained gravels. When the mean annual air temperature drops below 32° F, ground frozen during the winter may not completely thaw in the summer, and a layer of permafrost may form. This layer may continue to thicken below the seasonally frozen ground. The thickness of the permafrost layer is controlled by the balance between the mean annual air temperature and the geothermal gradient. As the climate becomes colder or warmer, but the mean annual temperature remains below 32° F, permafrost thicknesses correspondingly increase or decrease by changes in the position of the base and top of the frozen ground. These changes depend not only on the amount of climatic fluctuation, but also on the amount of moisture in the ground and on the combination of geologic factors that in part control the geothermal gradient. Thus, if the geothermal gradient and mean air temperature are known, and if the surface temperature is stable for a long period of time, it is possible to predict the thickness of permafrost in areas remote from water bodies. Permafrost is essentially a phenomenon of polar and subpolar regions. About 20 percent of the world's

land is underlain by permafrost. Perennially frozen ground is most widespread and thickest in northern regions of the northern hemisphere. Approximately 82% of Alaska is underlain by permafrost. Perennially frozen ground is 2,000 feet thick in northern Alaska and progressively thins to the south. In the northern hemisphere, perennially frozen ground is differentiated into two broad zones of lateral continuity. The continuous permafrost zone and the discontinuous permafrost zone. In the continuous zone, permafrost is present everywhere except under lakes and rivers that do not freeze to the bottom. The discontinuous zone includes numerous permafrost-free areas that progressively increase in size and number from north to south."

3.3.1 The Typic Cryochrepts Soil Association

This association occurs extensively in the uplands of Interior Alaska and constitutes the major soil association in the Fortymile River drainage. It occurs on high rounded ridges and hills and valley side slopes typical of the Tanana hills region. Elevations can range from 1,000 to 3,500 feet and can occasionally exceed 4,500 feet. These soils have developed from a variety of parent materials. On the hills they have formed from material weathered from the local bedrock. In the valleys they have formed from deep loamy sediment washed from the surrounding uplands. These soils are almost universally underlain by permafrost.

The soils in this association are generally not suitable for cultivation and present severe construction or engineering restrictions. There are only limited areas suitable for commercial forestry or cultivation of vegetable crops. Those areas are located in the bottom of broad valleys where slopes, if disturbed, remain stable. Disturbance of the insulating vegetative mat on these soils can result in severe erosion. When this mat is disturbed or removed, the underlying permafrost begins to thaw and the loamy textured soil is susceptible to rapid erosion. On sideslopes this erosion can appear as gullying, mudslides, slope failures, and other forms of mass movement. In level areas the thawing can produce thermokarsts, which are areas of local subsidence resulting from the thawing of underground ice. Thermokarsts can become quite large and may eventually become lakes or ponds.

3.3.2 The Pergelic Cryaquepts-Pergelic Cryochrepts Soil Association

This association occurs on steep unglaciated hills and mountains in the Interior highlands. Most of the soil types have developed above treeline from very gravelly or flaggy colluvial material weathered from the local bedrock. Elevations range from 1,000 to 5,000 feet with some mountain peaks over 6,000 feet. The soils in this association are predominantly poorly drained, and ice-rich permafrost occurs on north-facing slopes.

Soils at the higher elevations and in well-drained areas at lower elevations are covered by a layer of sparse, shrubby vegetation. The highest elevations can develop patterned ground features such as solifluction lobes, stone stripes, and frost boils. At the lowest elevations and in natural waterways, the vegetation consists of a mixed white spruce/birch/aspen forest. Soils which are dominated by permafrost at shallow depths, such as on the north-facing slopes, support black spruce and sedge tussocks.

Soils in this association are too cold and steep for cultivation and support only very limited harvesting of commercial timber. These soils present severe restrictions for road location, building sites, or off-road trafficability.

3.3.3 The Lithic Cryorhtents Soil Association

This association occurs in the high mountainous regions of the area. Characteristically, the topography is very rough with deeply dissected valleys and sharp rocky ridges. Soils at the higher elevations are too shallow for permafrost to develop, but it can occur at the lower elevations. In this area the soils occur at elevations of at least 5,000 feet.

These soils are too steep and cold, and occur at elevations too high to support any cultivation or forestry. The steep slopes and occasional permafrost severely restrict construction or engineering within these soils.

3.3.4 The Histic Pergelic Cryaquepts Soil Association

This association is found in broad sloping or level uplands at elevations ranging from 1,000 to 3,000 feet. Soils in this association are almost universally underlain by shallow permafrost. Most of the soils have formed from thick, silty, colluvial material weathered from the local bedrock.

There is generally a thick mat of old organic material directly above the first mineral layer of the soil. All of the soils in this association present severe restrictions for any intensive use or development. Due to silty texture and extensive ice-rich permafrost, they are very susceptible to thermal and fluvial erosion if disturbed. These soil types are not suitable for either agriculture or forestry purposes.

3.4 Water Resources

3.4.1 Interrelationships and Overview

Water enters the watershed in three primary ways: as precipitation, intercepted atmospheric moisture, and condensation. Some of this water adheres to the leaves and branches of vegetation and is either absorbed, drips to the vegetated floor, or evaporates.

Precipitation reaching the ground contributes first to surface storage in the litter, or is ponded in depressions, or held in the snowpack. It then infiltrates the soil or runs off as overland flow. As water infiltrates, some flows laterally and eventually resurfaces as streamflow, while some percolates downward to the water table and contributes to groundwater.

Infiltrated water is detained temporarily by the soil as it migrates toward groundwater or streams, and a portion is retained, eventually to be evaporated or transpired. The amount of water retained

and available for use by vegetation depends on soil density, structure, depth, and organic matter content. Evapotransportation is related to the regional climate and to the microclimate as controlled by local slope, aspect, elevation, and vegetation.

Yield is defined as water not evaporated, transpired, or retained by the soil. It includes both surface runoff as streamflow, and subsurface contribution to groundwater. Streamflow is the net result of input (precipitation) minus loss (evapotranspiration, contribution to groundwater aquifers, and the capacity of the soil to store water).

While it is generally apparent that water exerts considerable control over vegetation, vegetation also has some control over water. Natural or human-caused modification of the vegetative cover has the potential to affect all segments of the hydrologic cycle, including:

1) The distribution of water and snow on the ground by wind.
2) The amount of water intercepted or evaporated by foliage.
3) The amount of water that can be stored in the soil or by vegetation.
4) The physical structure of the soil, which governs the rate and pathways of water movement to stream channels or groundwater.

In turn, changes in any segment of the hydrological cycle can have a major effect on streamflow. Streamflow characteristics, such as annual yields and peak flows, can be altered by human activities such as placer mining, as well as natural events such as wildfire or vegetation loss to disease.

Atmospheric moisture contains dissolved gases and chemical ions, including some contributed by human activities. Generally, precipitation has a low dissolved ion content, and streamflow quality is largely determined by the remainder of the ecosystem. Water quality variables of concern include stream temperature, chemical composition, and sediment load.

Stream temperature is controlled by exposure to direct solar radiation and the temperature of inflowing tributary or ground water. Stream temperature may be affected by practices which remove shade from streamside areas or alter channel morphology, or introduce warmer or cooler water to the stream.

Aspects of the chemical composition of stream water include acidity, inorganic cations and anions, and dissolved organic substances. The chemical constituents and acidity are controlled principally by mineral weathering in the parent materials and soils.

The sediment load of a stream is comprised of suspended sediment (solid materials in suspension in the water column) and bedload (solid materials moving along the stream bottom). Total sediment load is determined by such characteristics of the drainage basin as soils, vegetation, precipitation, topography, and land use. Sediments enter the stream system by a variety of erosional processes. Vegetation inhibits erosion by protecting the soil and increasing the water-storage capacity of the basin. Removal of vegetation, on the other hand, decreases storage capacity, resulting in higher water levels and stream velocities and a corresponding increase in

erosion and sedimentation rates. Stream rechannelization can also increase flow velocities and erosion rates by straightening channel reaches and increasing stream gradient. To achieve stream stability, an equilibrium must be sustained between sediment entering the stream and sediment transported through the channel. Human activities such as mining, as well as natural events such as forest fires, affect sediment loading and can upset this balance, resulting in physical and biological changes in the stream system.

In discussing sedimentation within disturbed stream drainages, a distinction is made between point- and non-point sources. Point-source sedimentation (or pollution) can be traced to a single point, such as a mine effluent discharge pipe, and has a highly localized effect which may continue downstream for some distance, depending on site conditions. Non-point source sedimentation is the result of all activities in the basin that contribute to stream sediment load that cannot be traced to a single discharge point, such as the widespread removal of vegetation or rechannelization of stream reaches.

Turbidity and Sediment Load

Evaluating the effect on water quality of the sediment contribution from disturbed areas hinges on a understanding of the roles of turbidity, suspended sediment, and settleable solids. Analysis of suspended solids concentrations is conducted as a gravimetric determination of the particulate matter in a given volume of water. The results are usually expressed as milligrams per liter (mg/l). Turbidity is a measure of the optical properties of the water column, and the way that light is deflected or absorbed by particulates. This is affected by such characteristics as size and size distribution, shape, refractive index, and absorption spectral properties of the suspended sediments. While "suspended sediment" measures particle mass, turbidity measurements are more a determination of the effect of suspended sediments on light transmission, and therefore, the impact to the biological community. Turbidity is expressed in Nephelometric Turbidity Units (NTU). There is no direct relationship between these parameters, other than that they are both methods of measuring particulates. In part, due to the cost and effort required to conduct the required laboratory analysis, turbidity has been used as an indirect measure of suspended sediments (ADEC 1985).

Settleable solids are those materials in suspension in the water column which drop out as stream flow decreases. Analysis of settleable solids is conducted as a volumetric determination of the material which settles out of a given volume of water over a set period of time, usually one hour. The results are usually expressed as milliliters per liter (ml/l). The amount and distribution of material which actually settles out of the stream depends on stream velocity, time, and the characteristics of the particulate matter (relative size, shape, density, etc.). The slower a stream moves, and the longer that it remains in this state, the more material will settle out. Certain types of waste water treatment, such as settling ponds, work on this principle.

Generally speaking, it is the size and weight of the sediment particles that distinguishes dissolved, suspended, and settleable solids. The USGS classifies "suspended solids" as those particles which will not pass through a 0.45 micron filter. Particles smaller than 0.45 microns are classified as "dissolved." (Other agencies have somewhat different standards.) Settleable solids, on the

other hand, are those suspended particles which will drop out of the water column within a relatively short time, and tend to be heavier than those particles that remain suspended. Generally, turbidity measurements indicate the presence of suspended solids (organic or inorganic) in the water column.

Research indicates that to reduce the effects of sediments on aquatic environments to acceptable limits, certain standards must be achieved. Current State and federal standards can be found in Section 2.3.2.

3.4.2 Basin Characteristics

The Fortymile River is a non-glacial Interior stream with several major forks and tributaries. It flows into the Yukon River in the Yukon Territory, Canada. Over 90% of the basin is on the Alaska side of the international border. The U.S. portion of the basin lies in east-central Alaska in what is known as the Interior climatic zone. No long-term precipitation record exists for sites within the basin, but a comparison was made of the records for Eagle (54 years) and Tok (30 years), which lie north and south respectively of the Fortymile River drainage (AEIDC 1986). From these data, average annual precipitation in the watershed is estimated at 10-12 inches, with average annual snowfall of approximately 40 inches.

Limited streamflow records exist for the Fortymile River basin. The USGS operated a gauging station on the Fortymile River 0.3 miles downstream of O'Brien Creek from July 1910 to October 1912 and from October 1975 to September 1982 (USGS 1983). The average annual discharge for the 1975-82 period was 2,723 cfs (corresponding to an annual runoff of 0.5 cfs per square mile) with an extreme instantaneous peak discharge of 72,000 cfs (12.2 cfs per square mile) in May 1979. A flood event in June 1964 caused an estimated instantaneous peak discharge of 84,000 cfs (14.3 cfs per square mile). For most winters of record, streamflow dropped to zero at this station. King Creek, a small tributary of O'Brien Creek, has been gauged at the mile 120 Taylor Highway bridge from 1975-82 (annual maximums only) and 1983 to the present (mean daily discharges). The average annual discharge from 1983-86 (latest year available) was 1.4 cfs (0.24 cfs per square mile) with a maximum instantaneous peak discharge of 163 cfs (27.8 cfs per square mile) in June 1982. Streamflow dropped to zero during the winter months (USGS 1988). Partial-record crest-stage gauging stations (which record the annual high-water event) have also operated intermittently on several tributaries within the basin.

The above data suggest that peak stream flows within the Fortymile River basin occur during the spring breakup period. Spring breakup conditions can persist into mid or late June, and during this period peak water levels can rise between two and eleven feet above the ordinary high water mark on the South Fork and Fortymile Rivers. High water events can also occur in response to summer thunderstorms commencing between mid-June and the first of July. Summer thunderstorms, often totaling 0.5 to 1 inch of precipitation, are very common in the region. These intense rains can cause river levels to rise quickly and create localized flooding.

Precipitation varies widely throughout the Fortymile River basin due to topography, and is generally greater at higher elevations than along the lower reaches of the river. Low pressure systems from southeastern and northwestern Alaska often limit the extent of general rain coverage to the higher terrain of the Tanana Hills and North Fork alpine region. Flood waters often flow from the Dennison, Mosquito, and North Fork Rivers, raising the water levels of South Fork or Fortymile Rivers when little or no thunderstorms or general rain activity is observed on the lower segments.

Precipitation varies with the season, normally peaking in July or August. Approximately 70% occurs during the period from June through September. High water events in the drainage last two or more consecutive days. Approximately 20 days of high water can be expected during the summer where the water levels may rise up to or above the high water mark. The number of high water events fluctuate dramatically from year to year; 1985 and 1986 were good examples of year to year extremes. Water levels in 1985 seldom fell below the high water mark, yet in 1986 water levels seldom rose to the high water mark.

A brief description of the stream segments included within the National Wild and Scenic River system follows. It is essentially a condensation of the description contained in the Fortymile River Management Plan (DOI 1983). See the Tributaries and Main Physical Features Map in Chapter One for locations of various topographic features.

The upper North Fork is a narrow, entrenched river, with few gravel bars. The uplands are dominated by open, moist tundra areas with little terracing. The river is swift, with numerous small rapids, and requires normal to high water levels for boating. The stream gradient is approximately 18 feet per mile.

Champion Creek originates in the alpine tundra of the Wallcut Mountain area and flows through the subalpine zone to its confluence with Little Champion Creek. From this point it meanders through a gravel bottomed "U"-shaped valley to the North Fork.

Joseph Creek rises in the rocky alpine divide between the Charley, Goodpaster, and Fortymile River drainage basins. It is a steep stream in rugged terrain, and receives very little human use.

The Middle Fork below Joseph Creek is a clear-water stream flowing through a valley bottom of up to one mile across. Numerous substantial tributaries enter this section of river. Extensive sand and gravel bars are a common feature around their mouths. The Middle Fork drains a relatively large area and water levels are sufficient at all but the most extreme low levels to float canoes or rafts. The average gradient is approximately 10 feet per mile.

In the lower reaches of the North Fork the gradient drops and the sinuosity increases. The river in this area ranges from approximately 30 to 70 feet in width with pools up to 20 feet deep Interspersed with numerous rapids. The Kink is a unique feature of the North Fork located at about mid-reach between the confluence of the Middle Fork and the confluence with the South Fork. This feature was created in 1900 by a group of miners who blasted through a 100-foot rock ridge to drain a 2.8 mile long meander. At this point the river drops 18 feet through a short series of

falls, causing an impediment to navigation. The significance of this feature is discussed in Sections 3.7 and 3.8.3.

The Mosquito Fork from the mouth of Ketchumstuk Creek to river mile three flows through a wide valley. It is generally about 10 to 25 feet wide with numerous gravel bars. The stream gradient averages five feet per mile. Below river mile three the river winds through high bluffs alternating with bog flats, and widens to approximately 15 to 45 feet with occasional pools five to ten feet deep. The stream gradient increases to eight feet per mile and there are numerous small rapids. It is more shallow, and for the first mile the stream runs over coarse bed material through wet tundra flats. The gradient here is about eight feet per mile, and the stream ranges from approximately 70 to 150 feet wide. Around river mile 34 the bottom material becomes finer, and the stream spreads out into several channels for approximately one mile, then returns to a more defined channel to its confluence with the Dennison Fork.

Logging Cabin Creek is a narrow, tightly meandering stream flowing from the steep flanks of Mount Fairplay. There is generally not enough flow to float canoes or rafts.

The West Fork of the Dennison, from Logging Cabin Creek downstream to the Taylor Highway, is a meandering stream in a wide river valley. The river flows past numerous muskeg swamps, oxbow lakes, and gravel bars. The average gradient is eight feet per mile and the stream ranges from approximately 15 to 40 feet wide. It is floatable at normal or higher water levels. Below the Taylor Highway bridge the river is clear and quick flowing, passing through occasional low bog areas. Below the confluence of the West Fork with the main stem, the Dennison Fork flows through an entrenched canyon with increased meandering and shallow pools five to ten feet deep.

The South Fork arises at the confluence of the Mosquito Fork and the Dennison Fork. The first 5.2 miles are generally paralleled by the Taylor Highway which provides numerous points of access. Past and present mining activities dominate this section of the river. Between river miles 7 and 12 it is a deeply entrenched, meandering stream which flows in a northerly direction. The stream width ranges from approximately 100 to 300 feet, and depths are often in excess of five feet, with an average gradient of about ten feet per mile. There are minor rapids separating placid pools of up to one-half mile long. Short, swift flowing tributary streams drain the adjacent steep slopes. During normal water years there is sufficient flow for rafts and canoes, and it is possible to operate small motorboats. Water quality in this stretch has been impacted by upstream placer mining and instream suction dredging. The water has been (especially in 1982-83) affected to the extent that visibility into the stream is at times reduced to less than two inches. From river mile 12 to the confluence with the North Fork the river remains physically similar. Here human impact is significantly reduced, and dredging activity is dispersed. Inflow from numerous tributaries serves to dilute the turbidity from upstream.

Walker Fork originates in an open valley, with banks lined with good stands of spruce and tundra covered hillsides. It is about 30 feet wide with deep holes on the outside bends. The bottom material is generally fine sand and silt with some stretches of clean gravel. Below the confluence with Wade Creek the river flows over a bottom of gravel and bedrock. It is deeply entrenched and averages 70 feet in width with a gradient of as much as 30 feet per mile.

Wade Creek is largely a reflection of mining activity. Its course and bed has been completely altered for almost the entire length and there is little evidence of the original channel. The stream wanders through the old tailings piles or in constructed diversions from recent mining operations. Mining operations on Wade Creek have had considerable impact on downstream water quality due to the input of sediment and associated turbidity.

Napoleon Creek flows from the rounded hills to the east of the Taylor Highway to join the South Fork below Walker Fork. It is about seven miles in length and has been mined historically and in recent years.

Franklin Creek is another small tributary to the South Fork. The flows in Franklin Creek can be extremely high during spring breakup, dropping to a bare trickle by mid-July.

Uhler Creek is also a short tributary to the South Fork. It flows over a gravel bottom through a "U" shaped valley. Uhler Creek has a total disturbance of approximately 0.75 miles on the entire length of seven miles, but still has many federal claims along its course.

The mainstem of the Fortymile River originates at the confluence of the South and North Forks. The combined flow allows easier navigation at low flows, and reduces the effects of sediments contributed by the South Fork. Access is available at the Fortymile River bridge near the O'Brien Creek confluence and at Clinton Creek in Yukon Territory, Canada. The lower Fortymile, commencing at the Fortymile bridge, flows east 23 miles toward the Alaska/Canada border and has received the highest mining use of any navigable river in the drainage. Recent upland mining activities are visible at numerous locations; suction dredging also occurs along this segment.

O'Brien Creek is a winding stream flowing over a gravel bed, with a gradient of about ten feet per mile. The creek averages about 30 feet in width, and is generally confined by banks three to five feet high which are stabilized by the tundra mat. The Taylor Highway crosses the creek near its mouth and parallels it for its entire length. Although the creek is floatable at moderate to high flows, conditions such as narrow channels, sharp meanders, and numerous sweepers make this an unusual and hazardous undertaking.

King Solomon Creek and Chicken Creek have been channelized by historic mining activity. Dams on Wade Creek and Lost Chicken Creek in support of mining activity have no doubt caused changes in the stream channel.

3.4.3 Water Uses

The major industrial water use in the area is for placer mining operations and support facilities. Most of this use is non-consumptive and the waters are eventually returned to the stream system. The small community of Chicken obtains the majority of its water from local creeks and the Mosquito Fork. Additional water uses include recreational mining, boating, and fishing in areas not directly affected by mining.

3.4.4 Water Quality

BLM is charged to cooperate with "appropriate State water pollution control agencies for the purpose of eliminating or diminishing the pollution of waters of the river." (Sec. 12(c), Wild and Scenic Rivers Act , P.L. 94-199). Each state is charged by the Water Quality Act (WQA) of 1987, "to [control] pollution added from non-point sources to the navigable waters within the State and improving the quality of such waters." The BLM has responsibilities under the WQA and is required to cooperate and coordinate with State government on non-point source control activities (DOI 1988d).

Particulates

The highest turbidity levels occur during breakup when a large sediment contribution is made through non-point source sediment loading of all river segments. The perceived water quality appears muddy; water clarity ranges from negligible to a few inches. Deposition of fine alluvium (sand and silt) is significantly reduced below the high water mark as the water level drops. Although all streams can carry large sediment loads and increased turbidity during the spring breakup, as the flows drop the water quality generally improves and the streams run clear.

Sand and silt are deposited on the upper shoreland and in the riparian vegetation during the breakup period. Large quantities of sand and silt are found isolated in large eddies and high shore areas subject to deposition of the lighter materials from the slower water (sand/silt) during high water events. These areas are infrequent due to the few geologic features that contribute to heavy deposition. Most of the riverbed and shore materials are transient due to the steady gradient and fast flowing water, ranging between three and six miles per hour, from breakup to freezeup. Lighter materials contributing to turbidity appear to be flushed from the riverbed in the higher gradient areas below the high water marks during summer high water events and are deposited in the lower gradient areas downstream. Most river segments are noted for their low sediment buildup below the high water mark. Sediment buildup is controlled by the gradient of the river and high velocity waters that effectively transport fine material downstream to lower gradient areas and the Yukon River.

Summer thunderstorms contribute to high water events and increased turbidity lasting two or more consecutive days. Thunderstorms cause high turbidity levels approximately 20 days during the summer. Turbid waters often flow from the Dennison, Mosquito, and North Fork Rivers when little or no thunderstorm activity is observed on the South Fork or Fortymile Rivers. Storms in the alpine regions can flood upland tributaries and increase turbidity levels on navigable river segments, although these segments may not receive any direct precipitation. Overall, turbidity and total suspended solids follow the volume during river fluctuation (Mack et al. 1987); as volume increases, so does turbidity.

During low water periods, when water clarity is greatest, rivers and streams in the Fortymile drainage appear discolored; the reddish light-brown effect is caused by natural occurring tannic acid. Tannin is picked up by groundwater percolating through live vegetation and organic materials leaching into free flowing streams.

There are limited historic data on sediment loads in the Fortymile River drainage. The USGS took miscellaneous suspended sediment measurements at the Fortymile River gauging station 0.3 miles downstream of O'Brien Creek from 1979 to 1982. A summary of these data is presented in Figure 3-2. Stream surveys in 1975 reported sedimentation and cementing of the streambed of Chicken Creek to the point of eliminating fish habitat (ADF&G 1987a).

Date	Discharge, instantaneous (cfs)	Suspended sediment (mg/l)	Suspended sediment (tons/day)
5/11/79	10,000	13	355
5/22/80	12,200	42	1,380
6/29/80	1,750	6	28
9/23/80	3,540	8	76
5/29/81	15,200	64	2,630
8/20/81	2,970	36	289
9/23/81	5,370	19	275
5/27/82	25,300	244	16,700

Figure 3-2. Suspended-sediment and discharge data, Fortymile River, 1979-1982.
USGS 1983, 1982, 1981, 1980.

Recently, with the concern over water quality as a result of designation as a component of the National Wild and Scenic River System, water quality has been monitored at several locations in the basin. Data collected in 1985-86 indicate that there have been improvements in the water quality at selected sites in the Fortymile River drainage below mining operations. The settleable solids standard was met consistently in 1986 and the turbidity values were considerably reduced from 1985 levels, though still not within State standards (ADF&G 1987b). Data taken during the 1987 mining season are presented in Figure 3-3. The 1987 mining season was the last season in which mining operations were not reduced as a result of the court injunctions.

Grab samples were taken during the 1987 mining season at several points downstream of the Walker Fork confluence with the South Fork in addition to those points identified in Figure 3-3. In general turbidity levels at all sites monitored in the Fortymile River drainage were low. The relatively high initial levels reflect the high flows that existed at all sites when the monitoring program was initiated. For the rest of the monitoring period turbidity levels exceeded 5 NTU only on Jack Wade Creek and Walker Fork.

Riverbed Description

The riverbed and shore below the ordinary high water mark consist primarily of boulders, cobbles, and gravel. The sand and silt content is relatively low compared to the combination of cobbles and gravel. Visually, the high content of washed cobbles and gravel is obvious and the material characteristics of the riverbed and shore are consistent throughout the navigable river segments. Suction dredgers occasionally mine into small discontinuous lenses of thick, silty colluvial material weathered from the local bedrock. The fine sediment is occasionally found layered between the coarser and heavier riverbed sediment deposits and bedrock of the riverbed.

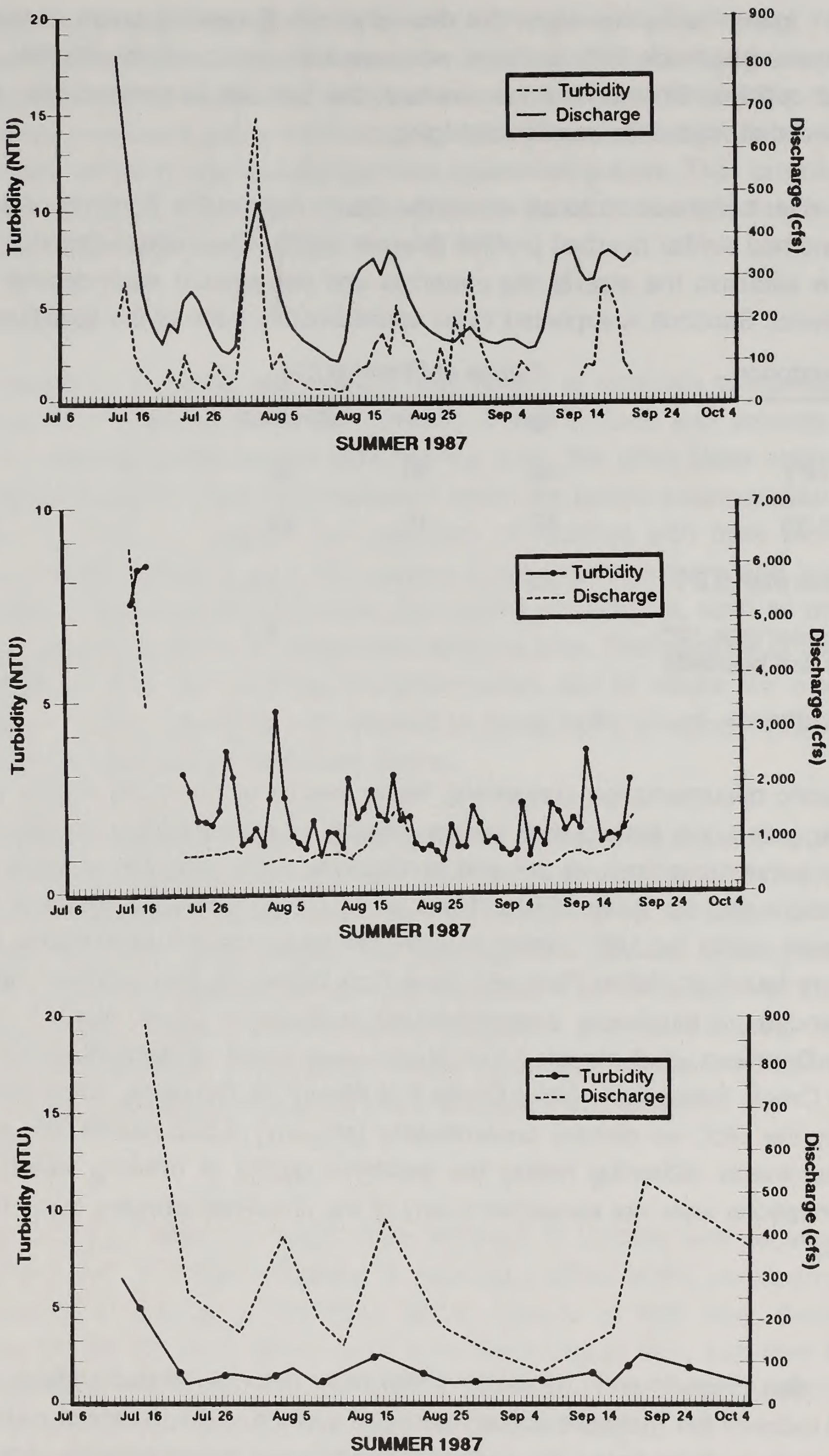


Figure 3-3. Turbidity and discharge readings at Walker Fork below the Taylor Highway Bridge (top), South Fork at the Taylor Highway Bridge (middle), and West Fork Dennison above the Taylor Highway Bridge (lower).

Exposed bedrock intermittently traverses the river channel. Extensive areas of the riverbed are composed of exposed bedrock, with surfaces worn smooth, and overlain with little or no deposition of sand and cobbles. On much of the riverbed, the bedrock is covered with a thin layer of cobbles and gravel that is ideal for suction dredging.

Sampling of the river bottom at 10 locations on the South Fork of the Fortymile and its tributaries found all locations had similar riverbed profiles (Maurer 1987). The deposit descriptions and range of findings below establish the size of the materials and the amount each deposit contributes to the riverbed material. Sand/silt is expected to be approximately 7.5% of the total riverbed material.

Deposit Description	Range of Findings (%)		
	High	Low	Average
Cobble (3"-12")	85	35	62
Gravel (0.2"-3")	55	10	26
Sand/Silt (less than 0.2")	25	0	7.5
Boulder (greater than 12"); two sites had boulders			4.5

Chemical Constituents

There is no historic documentation concerning heavy metals or non-point source pollution in the Fortymile drainage and only limited data on the impacts of placer mining on stream channels in the area. A few parameters such as pH and conductivity were analyzed at various sites by the USGS in the 1950's and the early 1970's. Mack et al. (1987) analyzed chemical constituents in the Fortymile basin during the 1987 mining season. For total recoverable samples, elevated levels of chromium were found at Walker Fork and West Fork Dennison, and elevated mercury at South Fork. Recommended pH tolerances were exceeded at Buckskin Creek, North Fork, South Fork, and West Fork Dennison, and elevated iron levels were found at Jack Wade Creek, Mosquito Fork, Napoleon Creek, South Fork, Uhler Creek and West Fork Dennison. Chromium and mercury are classified by the DEC as primary contaminants (affecting public health) and pH and iron as secondary contaminants (affecting mainly the aesthetic quality of drinking water). Primary contaminant concentrations were not exceeded in any of the dissolved samples taken in the Fortymile drainage in 1987.

Groundwater

Groundwater studies (Bjerklie and LaPerriere 1985) have determined that sediments deposited in the stream bed reduced the hydraulic contact between surface and subsurface waters and caused the piezometric surface to be below the surface water level on mined streams. Additional impacts of this isolation were cementing of the stream substrate and a significant decrease in the dissolved oxygen concentration and conductivity of subsurface waters. Groundwater springs and seeps are often associated with aufeis, the name given to ice which forms by water overflowing onto a surface and freezing in layers. Depending on discharge, water temperature, and air temperature, large areas can become covered with ice several feet thick. Aufeis can also affect

the lower reaches of rivers, which generally remain frozen later into the spring, when over-ice flow from more rapidly melting headwaters freezes in layers over the existing downstream ice. Although primarily a winter phenomenon, thick aufeis can persist into late spring and delay breakup in localized areas. Increased aufeis formation has been associated with placer mining operations in other drainages, probably due to seepage from excavated gravels. This can hinder revegetation in aufeis-susceptible areas. There are no data available on increases in aufeis in response to disturbances in the Fortymile River drainage.

Hazardous Materials

Most mining operations in Alaska use only a limited variety of materials categorized as hazardous. In the Fortymile River drainage these are currently limited to fuels and solvents. The use of explosives or the chemical processing of gold-bearing ores, the other likely sources of hazardous materials in placer operations, are not anticipated within the period encompassed by this analysis. Regulations at 40 CFR 112 require that operators of facilities with fuels stored in excess of 660 gallons per single container or 1,320 gallons in aggregate prepare and implement Oil Spill Control and Countermeasures (SPCC) plans. Secondary containment, such as provided by a continuous berm or dike, is required in conjunction with the plan. The purpose of the regulation is to reduce the likelihood of a spill reaching navigable waters and to reduce the extent of damage if such a spill should occur. Operators are required to report spills entering navigable waters or adjoining shorelines to the National Response Center.

State regulations (18 AAC 75) require differing levels of response depending on the amount of hazardous material spilled. However, any spill must be reported. Ultimate disposal of hazardous substances must be approved by the Department of Environmental Conservation (DEC); however, no permit is required. While little attention has been given to disposal of solid wastes in the past, the DEC intends to require compliance with the regulations in the future. The current recommendation for such waste disposal is burning combustibles and back-hauling non-combustibles. Landfills may be permitted on a site-specific basis. Long-term camps are required to meet DEC waste and refuse disposal requirements to avoid land and water pollution.

Conclusions

Placer mining has been shown to result in an increase in turbidity and sediment load, and the resulting sedimentation of stream channels. A secondary effect is the resuspension of deposited sediments, resulting in increased turbidities during periods of high flow. Sediment loads and deposition rates for the Fortymile River basin have been higher than expected for a clear water tributary. It has been estimated that the normal bankfull, or two-year flood, is insufficient to remove sediments from the gravel beds, resulting in cementing of the stream channel in some areas (ADF&G 1987b). It is possible that such cementing of the stream channel can result in changes in the piezometric surface of the drainage, with perched stream beds, decrease in oxygen content and elevated conductivity levels of the groundwater, and subsequent changes in channel morphology. Mining activity has resulted in increased concentrations of some constituents, as well as transport of trace metals in conjunction with introduced sediments. Sedimentation is also apparently occurring through erosion from washed-out settling ponds, unstable

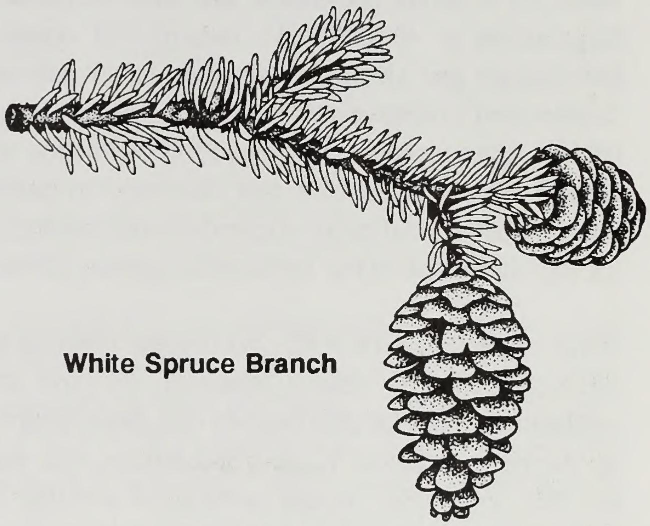
ground, and disturbed stream beds even when there is no active placer mining. Studies show these effects continue after mining has ceased.

The possibility for an increase in water pollution from suction dredge mining and ancillary activities is recognized. Currently State agencies and BLM allow suction dredging and ancillary activities to continue, recognizing that individually and cumulatively, each mine does not contribute to the impairment of the ambient water quality within the Fortymile drainage. No water quality standards violations for turbidity have been detected as a result of suction dredging activities through the State's Ambient Monitoring Program for turbidity (ADEC 1988).

3.5 Landcover

3.5.1 Introduction

The vegetation components of an ecosystem grow in response to the elements in the environment. As discussed previously under Soil and Water Resources, Sections 3.3 and 3.4, vegetation influences and is affected by the complex interrelationships of biotic and physical factors. The resultant vegetative communities vary in the species present, the percentage of these species, the spatial and vertical arrangement of the plants, and in the productivity of organic material.



White Spruce Branch

The vegetative cover of an area is an integrated expression of historic and present conditions and disturbances. Burned areas are visible in the mosaic of vegetation patterns over 100 years after the wildfire. Riparian vegetation on floodplains results from ice-free well-drained soils. Prostrate alpine vegetation has adapted to short growing seasons and exposure to desiccating winds throughout the year. Shallowly rooted black spruce grow on ice-rich permafrost soils. The ground cover of *Sphagnum* moss insulates the soils and contributes to the lowered soil temperatures which result in permafrost. Wetland communities grow in response to a high water table, and serve as a buffer to fluctuations in the water table.

Vegetation is an important component of habitat for wildlife and human populations. Vegetation Is used for food and shelter by most species in the watershed. Sometimes, animals impact the vegetation sufficiently to change the community on a site. Moose may severely overbrowse the willows of an area, beaver may flood out sedge/shrub meadows, or humans may remove the vegetation entirely in the course of mining activities.

After various disturbances, the vegetation usually grows back on a site. A series of different communities usually replace each other as environmental conditions change. This process is called

succession. The community composition and rate of change result from the severity and size of the disturbance, the soils and climatic conditions on the site, and the availability of seeds or vegetative propagules, as well as conditions favorable for their establishment.

Landcover types in the Fortymile River watershed are fairly typical of distribution patterns throughout Interior Alaska. The mosaic of vegetation communities within the watershed has developed in response to a variety of environmental factors, including climate, physiography, surficial geology, soil character, discontinuous permafrost, and disturbances such as fire, flooding, and human actions, including placer mining. Portions of the riparian zone in the Fortymile River watershed have been influenced by placer mining over the past 90 years, as have most other drainages in the Yukon-Tanana uplands.

3.5.2 Description of Vegetation Types

Most of the major landcover types typical of Interior Alaska are represented in the Fortymile River watershed (Figure 3-4). The landcover types are based on the Alaska Vegetation Classification System (Viereck et al. 1986 and 1987). This five-level classification system is specifically designed to describe vegetation associations from a general level (Level I including forest, scrub, and herbaceous) to a detailed description (Level V, which incorporates the scientific names of the species of plants in the associations).

The watershed is fairly rugged and dissected, bounded by mountains to the north and west, with broad rolling valleys in the south, and small-scale features in the middle of the watershed. The river channels are incised into steep-walled canyons. Burned areas from wildfires are scattered throughout the drainage, especially east of the Canadian border. The vegetation patterns reflect the topographic diversity. Various plant communities are distributed in a fine mosaic, with more spatial variation than found in other watersheds of the Yukon-Tanana uplands.

The upland areas of the watershed are characterized by alpine tundra types and a diversity of forest types whose distribution is affected by such factors as slope, aspect, soils, permafrost, and repeated fire patterns. Riparian areas along stream channels on current and former floodplains and old terraces support a variety of forest, shrub, and herbaceous types in various stages of succession, dependent upon a site's history of fire, floods, and mining.

Alpine tundra and sparsely vegetated communities grow on the various domes and high country above 4,000 feet, at the headwaters of Middle and North Forks, on Mt. Fairplay and Mt. Warbelow, and on other ridges throughout the drainage. The alpine tundra areas have plant associations of *Dryas* dwarf scrub, plants belonging to the ericaceous (heath) family; and dwarf scrub of bearberry, blueberry, and mossberry. *Cassiope* is widespread on moist alpine sites, as is willow tundra. There is a variety of lichen species, including fruticose and crustose growth forms.

Lower rolling slopes support communities of dwarf and low shrubs, and sedge/shrub tundra. Mixed in with the forest components are tall and low scrub communities of alder, willow, dwarf birch, and ericaceous shrubs such as Labrador tea and blueberry. On the better-drained slopes

LEVEL I CLASS	COMMUNITY	LEVEL IV CLASS	PLANT CANOPY DESIGNATION
Forest	Riparian	White spruce	closed, open, woodland
	Riparian	Black spruce	closed, open, woodland
		Black spruce-white spruce	closed, open, woodland
		Black spruce-tamarack	open, woodland
	Riparian	Balsam poplar	closed, open
	Successional	Birch	closed, open
	Successional	Aspen	closed, open
	Successional	Birch-aspen	closed, open
	Riparian	Spruce-birch	closed, open
		Aspen-spruce	closed, open
	Riparian, Successional	Poplar-spruce	closed, open
Scrub	Riparian	Tall willow	closed, open
		Tall alder	closed, open
	Riparian	Tall alder-willow	closed, open
	Riparian	Low willow	closed, open, sparse
		Low willow-alder	open
	Riparian	Mixed shrub-sedge tussocks	open
		Mesic shrub birch-ericaceous shrub	open
	Riparian	Ericaceous shrub bog	open
	Riparian	Shrub birch-willow	open
	Riparian	Willow-graminoid bog	open
Dwarf shrub		Dryas tundra	
		Dryas sedge tundra	
		Vaccinium tundra	
		Cassiope tundra	
		Willow tundra	
Herbaceous		Midgrass shrub	
		Midgrass herb	
	Riparian, Successional	Bluejoint-herb	
	Riparian	Tussock tundra	
	Riparian	Sedge-dwarf birch tundra	
	Riparian	Wet sedge meadow tundra	
	Riparian	Wet sedge-herb meadow tundra	
		Subarctic lowland sedge wet meadow	
		Subarctic lowland sedge moss bog meadow	
		Alpine herb-sedge	
		Fresh herb marsh	

Figure 3-4. Landcover types in the Fortymile River watershed (Viereck 1986).

the ground layer may be composed of dry herbaceous plants, mosses, and lichens such as the *Cladina* groups (reindeer moss), and some graminoids. The poorly drained and wetter slopes are characterized by more alder and some willow with a ground layer of *Sphagnum* mosses, sedge tussocks, other mosses, and foliose lichens like *Peltigeria*. This mosaic of shrub and moss/sedge types is prevalent in the low valley of upper Middle Fork, and below the alpine zone in the valleys of the North and Mosquito Forks. Tussock tundra grows on the large, gentle, northwest facing slopes in the valleys of the West Fork and other drainages.

Deciduous forests occur on steeper south, west, and east-facing slopes throughout the watershed. Well developed stands of birch may be found on silt-loam ridges. Some valley slopes in the watershed were logged for firewood for the dredges (10-12 cords per day per dredge) in the early 1900's, or have been burned by wildfires. Many of these areas are currently vegetated with dense single-aged deciduous forests. A large fire in 1966 burned 250,000 acres in the valleys of Windy Creek and the West Fork. This area has regrown with successional communities of shrubs, graminoids, and young deciduous trees.

The riparian vegetation belt, consisting of mature white spruce, aspen, and willow were largely unaffected by the fire along major drainages such as Logging Cabin Creek, Dennison, and South Fork Rivers.

Extensive black spruce and low shrub/moss types grow on most of the gentle slopes and bottomlands in the drainage. Open black spruce and black spruce/birch stands are common on poorly drained, cold sites on north- and east-facing slopes. These slopes are underlain by permafrost. Large stands of black spruce are in the dissected mountains and lower valley slopes throughout the drainage.

Open white spruce and white spruce/black spruce stands are commonly found on the drier, well-drained south- and west-facing slopes. These mixed communities grow on the hills throughout the watershed. Birch, birch/aspen, and spruce/birch stands are vegetation associations which also grow on these slopes, but are successional to stands of white spruce as the climax vegetation.

Riparian

Riparian zones are defined by BLM as:

> "A specialized form of wetland restricted to areas along, adjacent to, or contiguous with perennially and intermittently flowing rivers and streams.... This habitat is transitional between true bottom land wetlands and upland terrestrial habitats.... Soils of the riparian habitat may not exhibit typical wet soil characteristics of other wetlands. If not, wet soil characteristics will exist close enough to the surface for the water to be used directly by vegetation. This vegetation may range from water-loving hydrophytes (such as pond weeds) through terrestrial forms (such as... cottonwoods, and willows)." (DOI 1979).

The vegetation communities in the riparian zone along the stream floodplain and lowland areas of the valleys are most impacted by placer mining, and would have the greatest variation in the

resultant impacts associated with the alternatives (Section 4.5). The riparian zone along the Fortymile River and its tributaries supports a community of white spruce, aspen, and balsam poplar in the lower reaches, and a community of low and tall shrubs in the upper parts of the drainage. The bottoms of certain creeks which have been historically dredged are mostly barren, with some shrub regrowth. Long-term camps for suction dredgers are located in the riparian zone of the Fortymile Wild and Scenic River corridor. These camps are primarily in the stream-side white spruce/balsam poplar community. Collectively, they impact approximately 20 acres. Impacts include loss of groundcover from traffic, and removal of some brush and trees.

The closed needle/leaf forest types (canopy cover greater than 60%) include white spruce along the rivers and drainages located on well-drained, permafrost-free soils, black spruce generally occurring on poorly drained organic soils which are often underlain by permafrost, and black spruce/white spruce forests on the river terraces. There is a closed, mixed forest type of balsam poplar/spruce which is an intermediate successional stage leading to the white spruce climax on floodplain sites. The lower reaches of the Fortymile River drainage are deeply entrenched. The riparian stringers in these areas are very narrow. Balsam poplar and spruce grow 15-100 feet on either side of the river, with aspen and spruce beyond the floodplain.

Tall scrub includes willow thickets which are especially characteristic of floodplains and river banks, and shrub swamps of alder and willow which occur on floodplains and in drainageways. Some tailings 30 years or older support well developed willow, alder, aspen, and balsam poplar communities.

Low scrub stands occur in wet stream bottoms, poorly drained lowlands underlain by permafrost, and floodplains. These communities include dwarf birch/ericaceous shrub bog, mixed shrub/sedge tussock bog, ericaceous shrub bog, shrub birch/willow, and willow/graminoid bog. Recently disturbed gravel bars and tailings support sparse shrub communities, usually willow, alder, aspen, and balsam poplar seedlings.

Wet sedge/herb meadows and lowland sedge/wet meadows are common on very wet, poorly drained sites with standing water; oxbow lakes and floodplains; and margins of ponds, lakes, and sloughs. Another herbaceous type is the pioneering community of grasses and forbs on recently disturbed gravel bars or tailings.

Wetlands

DOI defines wetland or wetland habitat as:

> "Permanently wet or intermittently flooded areas where the water table (fresh, saline, or brackish) is at, near, or above the soil surface for extended intervals, where hydric wet soil conditions are normally exhibited, and where water depths generally do not exceed 2 meters. Vegetation is generally comprised of emergent water-loving forms (hydrophytes) which require at least a periodically saturated soil condition for growth and reproduction. In certain instances vegetation may be completely lacking. Marshes, shallows, swamps, muskegs, lake bogs, and wet meadows are examples of wetlands." (DOI 1979).

Wetlands, an important component of the ecosystem, act as a buffer for water quality, and are subject to long-term effects after disturbances.

> "Wetlands play a major role in maintaining hydrologic systems and the quality and quantity of surface and ground waters. Some wetlands can absorb large quantities of water and act as natural flood control systems for rivers by gradually releasing floodwaters and reducing the magnitude of high flows. Wetlands may slow the rate of runoff during periods of normal rainfall and help recharge aquifers. In some places, sediments and pollutants may be filtered out of water draining through wetlands, and water quality may thus be improved. Wetlands are extremely important to resident and migratory birds for resting, feeding, and nesting and can be important foraging grounds for large mammals such as caribou, moose, and bear." (DOI et al. 1987f).

Wetlands have been defined by the Corps in 33 CFR 328 as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." The Corps definition allows that any vegetated area which is underlain by ice-rich permafrost typically meets the wetland definition. Therefore, many areas in the Fortymile River watershed below the alpine zone are wetland in character and subject to Section 404 of the Clean Water Act.

3.5.3 Successional Patterns

Revegetation on a 40-year-old tailing pile consisting of dry gravel with a small amount of fine materials.

The major causes of disturbance in the Fortymile River valley are wildfires and placer mining. After a site has been disturbed, a series of vegetation communities sequentially develop, one gradually replacing its predecessor in a systematic, successive manner. The process of succession is "the more or less orderly pattern of events and processes in nature whereby plant and animal species replace each other as a result of a changing environment" (Komarek 1971). The rate of succession results from the type, frequency, duration, and intensity of disturbance, and the basic environmental factors of a site. One simplified example of succession would be vegetation types of grass and forbs, replaced by deciduous shrubs, which are replaced in turn by a climax community of coniferous trees. A disclimax com-

munity is maintained in an area subject to continuous repeated disturbance (Daubenmire 1968). For example, aspen and birch stands are often maintained on south-facing slopes by repeated fires when white spruce would be the "normal" climax stage.

Succession in Mined Areas

Succession on placer mine tailings depends very heavily on the percentage of fine-grained materials or fines in the substrate (Holmes 1981, Rutherford and Meyer 1981). Fines (particles of silt and clay size) directly control the water, oxygen, and nutrients available to plant root systems, and the quality of the initial seed or rooting bed. Other important considerations are micro-relief and sources of seed or vegetative propagules. Vegetation of mine tailings is considered an example of primary succession because the tailings are usually undifferentiated mineral materials with little or no organic content or seed bed.

Revegetation - willows on tailings

Typically, mine tailings are initially invaded by grasses and forbs such as *Calamagrostis* and fireweed, with lupine and other legumes following. Scattered seedlings of willow and alder invade next, intermixed with birch or balsam poplar in some locations. Rose or bearberry may also occur, and initial bryophytes are usually *Stereocaulon* and hairy cap moss.

As the cover of shrubs expands, the ground cover increases and more species become established. Mosses such as *Hylocomnium* and *Drepanocladus*, and lichens including *Peltigeria*, *Cladina*, and *Cladonias* comprise the groundcover. At this stage, ericaceous shrubs usually colonize, including blueberry, cranberry, Labrador tea, and mossberries. Willow, alder, young birch and/or cottonwood comprise approximately 50% vegetative cover. The shrubs are one meter or more in height. Dying vegetation is replaced by seedlings or vegetative growth such as shoots. Spruce seedlings also begin to grow under the shrub cover during this period. The composition of the resultant community may be fairly stable for decades. This is the tall shrub community which is used to compare regrowth rates between alternatives (Section 4.5).

In cooler and wetter areas, the organic layer accumulates; *Sphagnum* mosses flourish; and permafrost redevelops. Eventually, a black spruce/low shrub/*Sphagnum* moss type covers the site.

In warmer, well-drained areas, a mature, single-aged birch and/or aspen stand usually develops, with alder, willow, and white spruce saplings in the understory. If left undisturbed, mature white spruce with scattered birch, aspen, or balsam poplar develops on the site. Riparian communities often develop old stands of 200 to 300-year-old white spruce and balsam poplar. Above the limits of tree growth, riparian zones usually consist of tall willow and alder.

Fire Succession

Past fire history and fire patterns have also influenced the distribution of landcover within the watershed. Fire changes the relationships between the plant and animal communities, as well as between the plants and the climate.

Lotspeich and Mueller (1971) speculate that the vast majority of Interior Alaska has burned within the past 200-250 years. The variations caused by fire burning patterns and the adaptations of different plant species to fire also creates a complex mosaic of plant communities and ecotones in various stages of succession. These plant communities provide habitats for a large variety of animal species. Fire creates more variations in both plant and animal communities than probably any other natural force. Fire-scarred landcover patterns have a visual impact on the esthetic qualities of an area for recreation utilization for many years after a burn (Komarek 1971). Fire may open up scenic vistas along a drainage, much like the 1966 fire on the Dennison Fork.

Often fire or fire suppression activities affect the thick vegetative mats that have a principal insulating effect on the soil thermal regime. When this mat is altered, the frozen subsoil, often rich in silt, is released when the permafrost melts. Surface slumping and sedimentation of streams are common results of this thermal disruption and can affect even flat terrain. The overall moisture relation and thermal effects from fire are more pronounced on the south-facing slopes where the moisture balance is more critical (Lotspeich and Mueller 1971). Current fireline rehabilitation practices significantly reduce the overall effects of fire suppression activities.

3.5.4 Threatened and Endangered Plants

Within the Fortymile River watershed study area there are no "listed" threatened or endangered plant species, though extensive research by David F. Murray and colleagues has revealed some "candidate" species. Candidate species are those plants included in the Federal Register "Notice of Review" listing that are being considered by the Fish and Wildlife Service (USFWS) for listing as threatened or endangered. The intent is to encourage better management practices to prevent these species from being listed as threatened or endangered. Endemic species are those considered vulnerable because of a significant current or predicted reduction of populations, numbers, or habitat (Murray and Lipkin 1987). They may also represent the northern most range of a species. Some endemic species are of undetermined status due to lack of complete studies.

Figure 3-5 lists the candidate and endemic plant species within the Fortymile River drainage and their status as recommended by Murray and Lipkin in 1987. The presence of additional endemic species within the Fortymile River watershed is a distinct possibility because some localities are

so remote that collections are sparse. Taxonomic studies are being conducted, but at this time they are incomplete.

Plant	Recommended Status	Habitat
Cryptantha schackletteana	Endangered	Steep south-facing treeless slopes below timberline
Eriogonum flavum var. aquilinum	Endangered	Steep south-facing treeless slopes below 1,600 feet
Podistera yukonensis	Threatened	Steep south-facing treeless slopes and unknown alpine habitats between 900-500 feet
Montia bostockii	Endemic	Wet, lower alpine areas
Papaver nudicaule ssp. americanum	Endemic	Roadsides, waste areas and well drained soils
Phacelia mollis	Endemic	Dry slopes, roadsides

Figure 3-5. Plant species of special concern.

3.6 Wildlife

Species and Habitats Present

Caribou, moose, Dall sheep, grizzly bear, black bear, and wolf are the big game species most commonly present in the Fortymile River watershed. Furbearers of economic importance in the area include marten, lynx, red fox, beaver, otter, and mink. Small game species include spruce, ruffed, and sharp-tailed grouse; willow and rock ptarmigan; and snowshoe hare. The peregrine falcon, an endangered species, inhabits the area as do other raptors, including the bald eagle, golden eagle, and red-tailed hawk. Waterfowl and many non-game mammal and bird species are also found throughout the area. Additional information concerning species description and distribution is available in Alaska's Wildlife and Habitat (ADF&G 1978a), Alaska Wildlife Management Plans - Interior Alaska (ADF&G 1976), and Alaska Habitat Management Guide for Mammals, Birds and Human Use (ADF&G 1986b).

The area contains year-round habitat of the Fortymile caribou herd (Caribou Range Map). The Fortymile herd has undergone wide fluctuations in population size over the past 50-60 years. During the early 1900's the herd was probably increasing in size, peaking in the 1920's at an estimated 250,000-500,000 animals. The range occupied at that time was very large, extending north of the Yukon River, with winter range stretching east to Dawson and Whitehorse and south to the Alaska Range and Nelchina Basin. The population began to decline in the 1930's, and its numbers may have reached a low of 10,000 in the early 1940's. By the early 1950's, numbers increased to approximately 50,000. The Fortymile herd began declining again in the early 1960's and by 1969 probably numbered no more than 20,000. In the mid-1970's numbers had decreased

Fortymile River Placer Mining

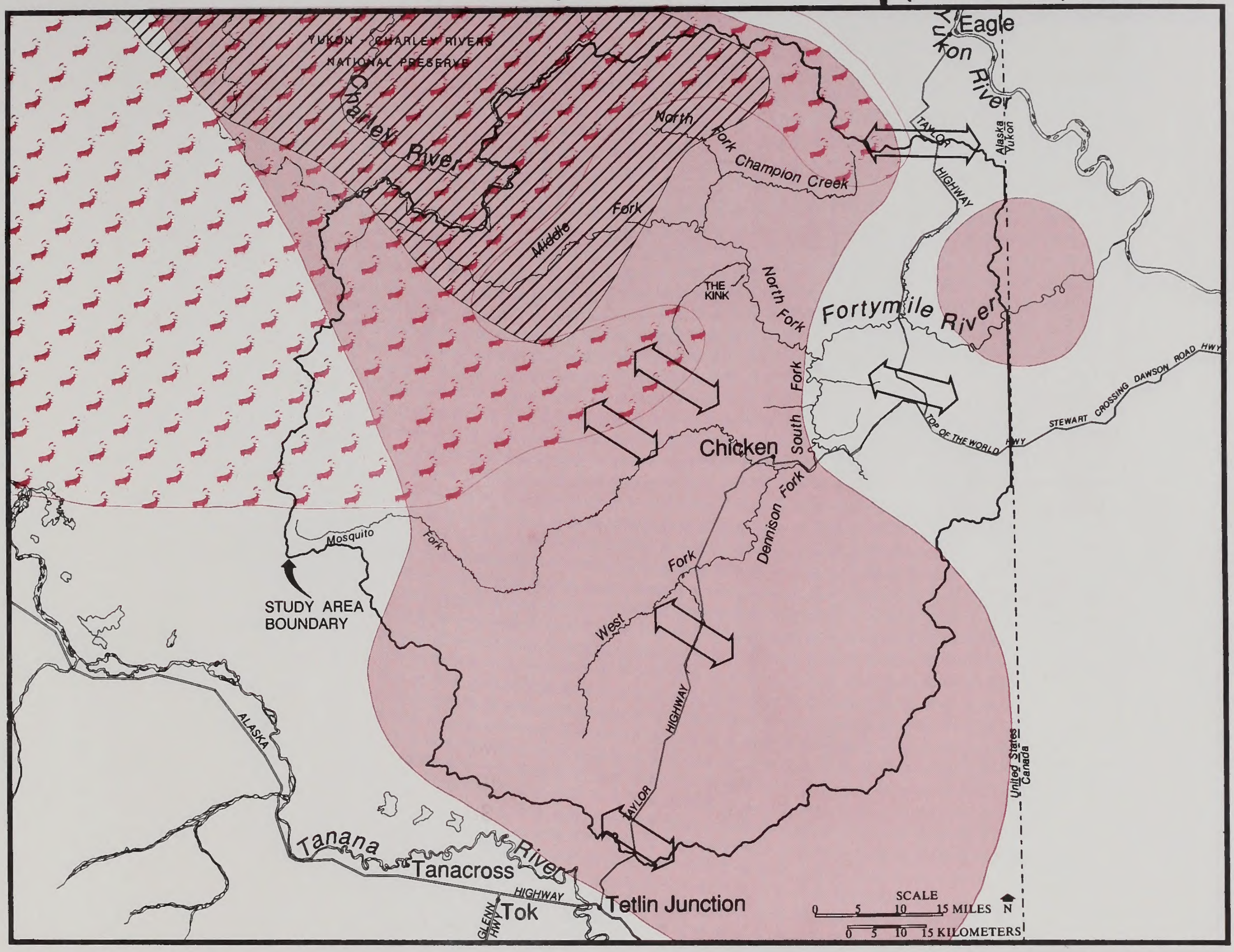
FINAL

Cumulative Environmental Impact Statement

Wildlife

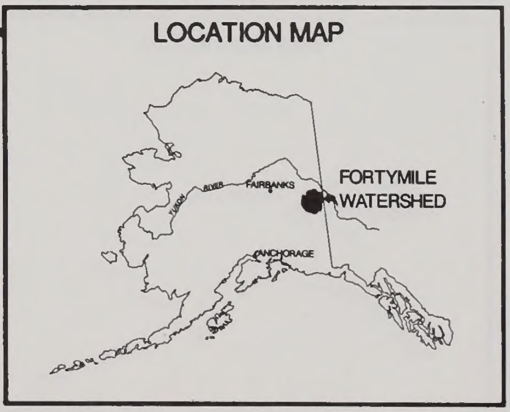
Caribou Range

Fortymile Caribou Herd (1981-1987)

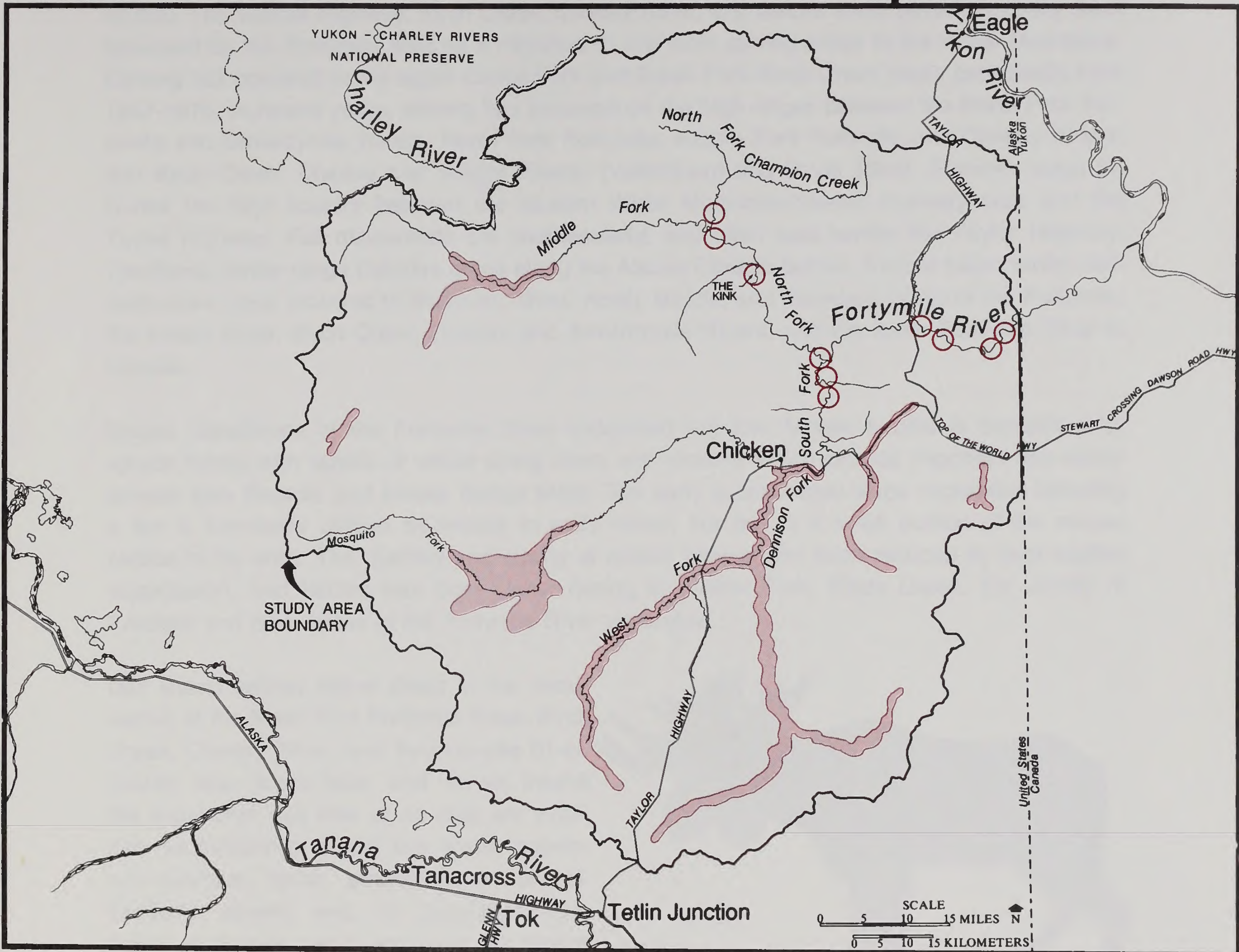


Legend

- Summer range
- Major winter use areas
- Calving concentration
- Principal move..ent routes



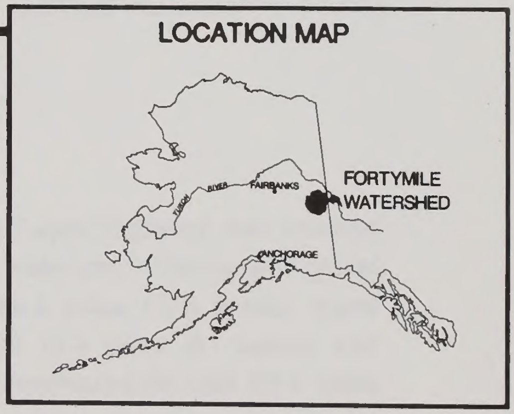
Wildlife 2 of 2
Raptors and Moose Range



Legend

Winter high use areas for Moose

Known raptor nesting habitat



to approximately 5,000 (Davis et al. 1976). The current population estimate is approximately 16,500 (Valkenburg and Davis, pers. comm. 1988) and the present ADF&G population goal is 50,000. The Steese Highway, Birch Creek, Charley River, and Salcha River have historically been traversed by the Fortymile herd as it migrated to and from calving areas in the White Mountains. Calving has occurred in the upper Clums Fork and South Fork Birch Creek areas periodically from 1957-1976. In recent years, calving has occurred on the high ridges between the North Fork Fortymile and Seventymile Rivers; North Fork Fortymile, Middle Fork Fortymile and Charley Rivers; and Birch Creek, Charley and Salcha Rivers, (Valkenburg and Davis 1988). Summer range includes the high country between the eastern White Mountains/Steese Highway area and the Taylor Highway. Fall movements are southeasterly, and often east across the Taylor Highway. Traditional winter range includes areas along the Alaska-Canada border. Recent major winter concentrations have occurred in Mosquito, West, North, Middle, and Dennison Forks of the Fortymile, the Ladue River, Birch Creek, Charley and Seventymile Rivers, and the lower Fortymile River in Canada.

Moose populations in the Fortymile River watershed are low. Moose habitat is dominated by spruce forest, with stands of willow along rivers and streams which provide important late winter browse (see Raptors and Moose Range Map). The early successional stage vegetation following a fire is commonly utilized by moose in early winter, but this is a small portion of the moose habitat in the area. The quantity and quality of moose browse has been reduced by past wildfire suppression, and habitat loss from placer mining in Walker Fork, Wade Creek, the vicinity of Chicken, and other areas of the Fortymile River watershed.

Dall sheep occupy alpine areas in the headwaters of the North Fork Fortymile River, Birch Creek, Charley River, and Seventymile River. Grizzly bear, black bear, and wolves inhabit the watershed, but little or no data are available for location of crucial use areas, population numbers, trends, productivity or survival. Similarly, specific data on population size, trend, productivity, and use areas for raptors (Raptors and Moose Range Map), furbearers, and small and non-game species is lacking.

Moose

Present Situation in Relation to Mineral Development

Construction of 72.5 miles of permanent gravel roads, excluding the Taylor Highway, has resulted in the loss of 439 acres of wildlife habitat in the Fortymile River watershed. Permanent gravel roads directly associated with federal mineral development total 29.4 miles (178 acres), those directly associated with State and private mineral development total 13.3 miles (81 acres), and joint-use roads associated with federal, State, and private mineral developments total 29.8 miles (181 acres).

The establishment and use of 79.9 miles of primitive roads and trails has resulted in 51,638 acres of wildlife habitat subject to short-term periodic disturbance by vehicular traffic when wildlife such as moose, caribou, and others are present. The primitive roads and trails in the Fortymile River watershed are used to access federal (53.2 miles/34,550 acres subject to disturbance), State and private (6.2 miles/4,470 acres subject to disturbance) and federal, State, and private (20.5 miles/13,622 acres subject to disturbance) mineral developments.

The present level of vehicular use on roads and trails (excluding the Taylor Highway) is low to moderate. Minimal alteration, disturbance, or disruption of wildlife movement routes, and seasonal use areas has occurred as a result of short-term periodic disturbance.

The South Fork Fortymile River and mainstem Fortymile River between the South Fork bridge and O'Brien Creek bridge (39 river miles) is the principal route used by dredgers to access their camps and dredging sites. As a result, periodic disturbance from operation of motor boats occurs along the South Fork and mainstem Fortymile River (29,255 acres) from June through September. The restrictions of the "lawsuit" on long-term camping increased the use of motorized boats on the river segments significantly during summer 1988. Suction dredgers traveled these segments by motorboat to campsites distant from their riverbed operations.

Red Fox

Improvement and expansion of access trails and roads into Hutchinson Creek, Mount Warbelow and other areas of the Fortymile River basin has indirectly resulted in increased harvest of moose, caribou, grizzly bear, black bear, furbearers, and other species during summer and fall.

Facilities associated with mining camps and structures in the Fortymile River watershed have resulted in the long-term loss of 33 acres of upland riparian habitat (approximately one acre per camp). Facilities directly associated with federal mineral development total 19 acres, those associated with State and private mineral development total 14 acres, and 20 dredger campsites total less than 20 acres. Similarly, 954 acres of riparian habitat used by moose and other species are unavailable for the short-term due to frequent human disturbance at these sites from May through October. Disturbance associated with facilities at federal mineral development sites account for 342 acres, while State and private activities comprise 252 acres of the total. Additional areas subject to indirect disturbance near dredger campsites total 320 acres. The removal of grizzly or black bears as nuisance animals has occurred due to their attraction to refuse or solid waste in the vicinity of mining facilities and dredger campsites.

Activities associated with stripping, mine cuts, stockpiles, and settling basins have resulted in physical alteration of about 1,050 acres of upland riparian habitat in Wade Creek, Walker Fork, the vicinity of Chicken, and other areas. The habitat lost to mining operations associated with federal mineral development during 1987 was 118 acres and habitat losses associated with State and private operations was 120 acres. Reclamation of federal mining areas has occurred through leveling tailings, stockpiling and respreading overburden, and natural succession. Reclamation on State and private mining areas consists of leveling tailings and natural succession (as described in Appendix B-4). Revegetation in previously undisturbed federal mining areas requires 30 years, and revegetation in old dredge tailings requires at least 50 years (Figure 4-2) to reach a stable tall shrub community suitable for sustained moose browsing. Revegetation in previously undisturbed State/private mining areas requires 30-50 years to reach a stage suitable for moose browse. Wildlife avoid 38,654 acres of riparian and upland habitat during the summer mining season due to noise from machinery and other mining activities. The area subject to periodic disturbance by noise from federal mining is 10,542 acres, disturbance from State and private mining is 8,032 acres, and disturbance from suction dredging (maximum 40 sites) is 20,080 acres. The possibility of fuel spills exists but no appreciable contamination or loss of wildlife habitat has been known to occur.

Conclusion

Approximately 1,760 acres of upland riparian wildlife habitat (primarily moose winter range) has been physically altered by mining and related activities (including roads and facilities) in the Fortymile River basin. Periodic disturbances to wildlife due to use of roads and trails, operation of boats, vehicles and machinery, and mining and dredging-related human habitation in the Fortymile River watershed. The total of 167,403 acres have resulted in a low level of short-term adverse effects in localized areas, particularly from May through October. Harvest of wildlife by people associated with mining and dredging activities has occurred at a low to moderate level in localized areas of the Fortymile River watershed. The principal long-term adverse effect of mining in 1987 in the Fortymile River watershed has been the unavoidable loss (including reclamation) of approximately 238 acres of the upland riparian habitat in Wade Creek, Walker Fork, the vicinity of Chicken, and other areas for a 30-50 year period. In addition, approximately 190 acres of the physically altered areas will probably remain permanently barren or support only sparse vegetation after 50 years. The long-term cumulative loss of habitat to federal (118 acres) and State/private (120 acres) mining activities in these areas of the Fortymile River has probably contributed to a low level reduction in moose population potential.

3.6.1 Threatened and Endangered Wildlife

The only threatened or endangered species present within the Fortymile River watershed is the peregrine falcon, which nest throughout the boreal forest of Interior Alaska. Historic populations were quite substantial, especially in the Yukon, Porcupine, and the Tanana River basins. The Fortymile River watershed contains areas of suitable nesting habitat along streams and upland areas with two to five breeding pairs present annually (Raptors and Moose Range Map).

Peregrine Falcon

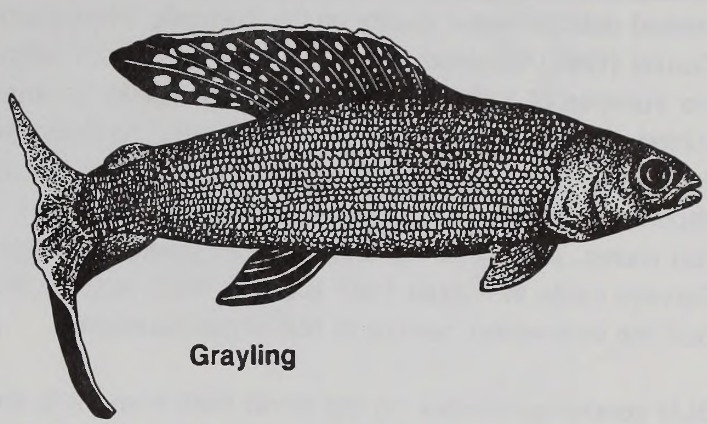
Monitoring trips conducted routinely from 1978 through 1987 report sightings of peregrines coexisting within sight and sound of operating suction dredges and long-term camps. Most eyries are located on high cliffs along the meanders above certain river segments. These topographic features assist in blocking or reducing noise levels of motorized equipment and other human activities. The birds are known to return to the same habitat and nest sites annually. Suction dredging operations are stationary for the most part, and peregrines and their prey have been observed near the operations. No intensive studies on peregrine falcon nesting in the Fortymile River drainage have been conducted to determine the effects of long-term camps or motorized equipment.

Motorized and floatboats disturb prey that occupy the water column and riparian areas. This is a temporary disruption limited to the period of time the craft is passing through the area. Motorized access points to suction dredging locations limit the necessity of entering habitat areas, especially on the upper Fortymile and South Fork Rivers.

The regional population of peregrines appeared to be quite stable until the mid 1960's except for local minor reductions in numbers (USFWS 1982). By 1970 a rapid decline in the population was evident. Data suggest that the principal cause for the decline was due to chlorinated hydrocarbons (ddt metabolites). High concentrations of these pesticide residues in breeding peregrines resulted in eggshell thinning and ultimate reduction in productivity (loss of young). The birds obtained the pesticide from contaminated prey on their breeding areas as well as en route to and from their wintering areas in Central and South America. Other factors contributing to the overall reduction in breeding populations were egg collection, human-caused disturbances, and habitat destruction.

Because of strict pesticide control and protective management nationwide, the overall population of the peregrine falcon has been steadily increasing over the last few years. Numbers of breeding pairs in the main nesting areas in interior Alaska have come close to historic levels, and it appears the population is approaching levels to allow dispersal into other drainages where re-occupation of historic nest sites and other nesting habitat is occurring (Ambrose, pers. comm. 1988). Maintenance and protection of this breeding habitat is a basic step towards establishment of a self sustaining population (USFWS 1982).

3.7 Fisheries


Grayling

Fish species reported in the Fortymile River drainage include arctic grayling, sheefish, round whitefish, longnose sucker, and slimy sculpin (see Fisheries Map). Other species that may occur are humpback whitefish, northern pike, burbot, chinook salmon, and chum salmon. Data collected on Fortymile River resident fish address summer distribution and aspects of life history. Information concerning resident fish species including salmon, within the Fortymile River drainage is marginal (ADF&G 1987b). Because data for the Fortymile River are limited, references will be made primarily to the segments within the Wild and Scenic Rivers System (DOI 1983, Map 1).

Two adult chinook salmon (one live female and one dead male) were observed 0.8 mile below the Kink, a channel blasted through the stream bank by miners in 1900, and 1.5 miles above the confluence of the North and South Forks (Carufel 1987). Prior observations reported chum salmon below the Kink in August 1981 during an ADF&G aerial survey and a chinook salmon caught by a sport angler in the North Fork Fortymile River above the Kink near Champion Creek (Dames and Moore 1982).

Canadian researchers using beach seines and baited traps on the lower Fortymile River and its tributaries in September 1984 collected 63 juvenile chinook salmon from Clinton and Mickey Creeks below the International border (vonFinster 1985). These two streams, and possibly others, may serve as rearing areas. Scattered, random sightings of what are considered stray chum and chinook salmon have occurred from historic times to the present. Since fidelity of returning salmon to natal spawning habitat is not 100% and the reported sightings are rare, the Fortymile River does not appear to support an established spawning population (Webb pers. comm. 1988).

Grayling are the most widespread species within the Fortymile River drainage. (ADF&G 1987b). A joint survey by BLM and ADF&G personnel (ADF&G 1975) reported grayling in several tributary streams of the Middle, North, and South Forks of the Fortymile River. Johnson (1980) collected grayling at Champion Creek, and Dames and Moore (1982) sampled the upper reaches of the North Fork in the summer of 1981 and found small numbers of grayling in Champion, Happy New Year, and Slate Creeks.

Indications that these streams are potential spawning areas are supported by grayling measuring 3-6 inches observed by Carufel (1987) in the Middle Fork near Joseph, fry collected by Dames and Moore (1982) in lower Slate and Champion Creeks and sampling by von Finster (1985) and Fortymile Placers (1986) who captured young grayling from the Fortymile River in Canada. These

potential spawning areas serve as rearing sites for young and juvenile grayling, and round whitefish.

Limited data for water quality on the Fortymile River drainage have been recorded (ADF&G 1975). Carufel (1987) obtained water quality samples from various stream sites on the Fortymile River In the summer of 1987. The prlmary water quality parameters determined were temperature, dissolved oxygen, total hardness and alkalinity, turbidity, and flow. In general the water quality for fish in the Fortymile River Is good. Tributary streams and the mainstem of the Fortymlle Rlver depend on snowmelt and summer rains to sustain flows needed for fish spawning, rearing, mlgration routes, and wintering. Spring water levels may determine whether fish move over the Kink. Surveys made In August 1987 (Carufel 1987) indicate that water levels were low, which could impact the over-wlnter survival of fish in this drainage.

BLM conducted studies on the North Fork from 1978 through 1980 (Johnson 1980; Webb 1979, 1980) to determine if the Kink functions as a obstacle to pre-spawning migration of arctic grayling. Observations made during a three-year perlod Indicate that the waterfall in the Kink is a barrier to upstream grayling movement during much of the year. Adult grayling move upstream to spawning areas in early spring, and a barrier during this time may be a significant deterrent to the establishment and/or maintenance of high populations in upstream areas. For the three-year, mid-May observation period, adult grayling were apparently blocked during 1978, but were able to pass for at least a brief period during 1979 and 1980 (Webb 1981).

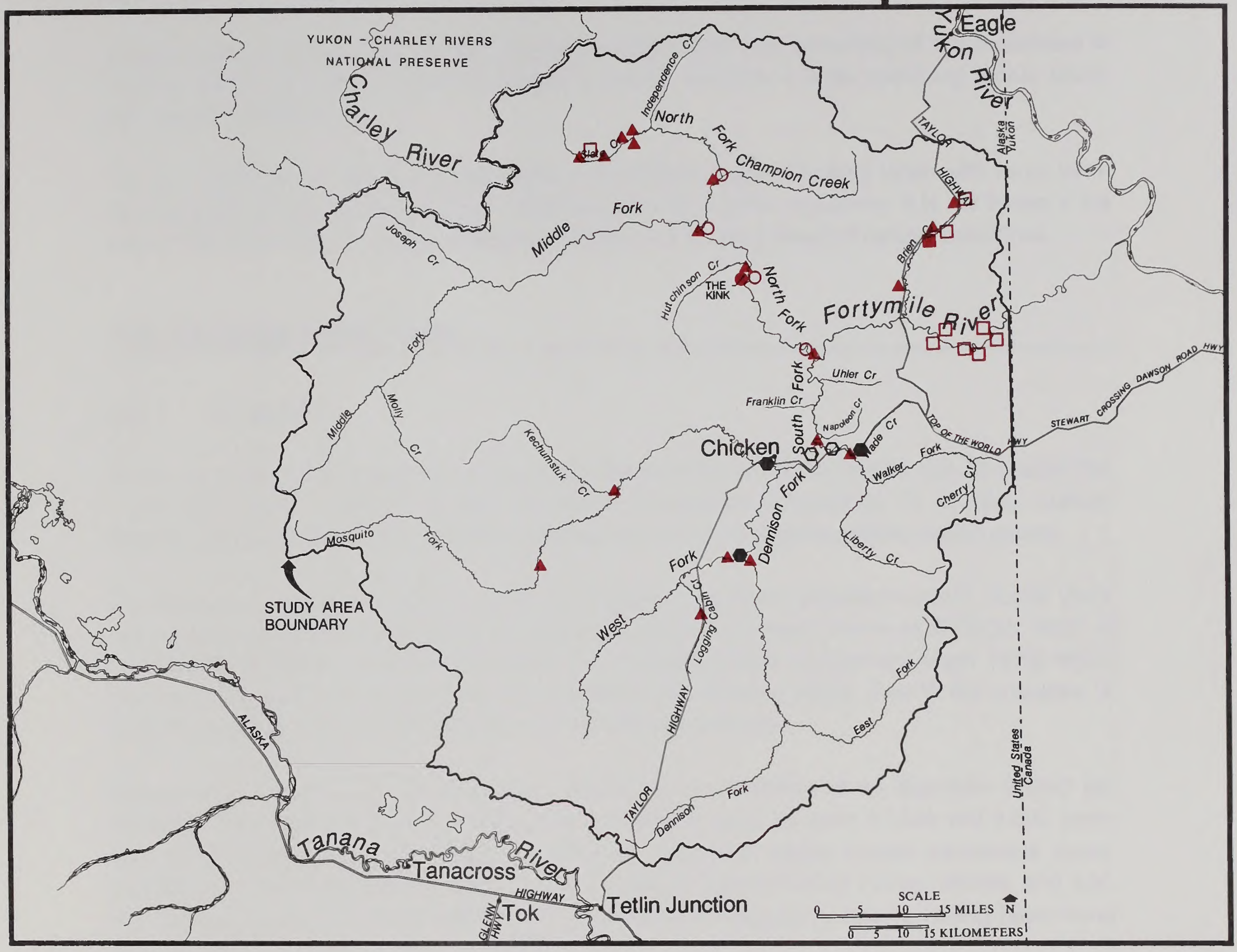
Overwintering areas may exist throughout the Fortymile River drainage. Data are limited on the locations of these sites. Dames and Moore (1982) found grayling fry in the upper North Fork Fortymile River that probably were spawned nearby, and suggest that the parents wintered above the Kink or successfully passed through it on their upstream spawning migration. Potential winterlng habitat was found upstream of the North Fork Fortymile River sampling site, in a pool below the new channel in Slate Creek, and in the pool below the Kink (ADF&G 1987b). Surveys conducted on the Fortymile River from Joseph to the Taylor Highway Bridge in August 1987 (Carufel 1988) found deep pools in areas where the river banks are steep and bluff-like. Several pools from 8-10 feet deep were scattered along the course of the Middle Fork below Pittsburg Creek. Pools 20 feet deep were reported (DOI 1983) from the Middle/North Forks downstream of the Kink.

Aquatic macro invertebrates were sampled by Carufel (1987) and Maurer (1987) for the Fortymile River watershed. Invertebrates collected were water fleas, shrimp, midges, craneflies, black flles, mayflies, round worms, aquatic earthworms, stoneflies, and caddis flies. These invertebrates could be considered representative for the Fortymile River drainage. Maurer (1987) found that out of ten sampling sites, the higher densities of invertebrates generally occur in streams that have little or no mining activity, while lower densities occur in streams that have moderate or high mining activity. However, In two sample sltes, the reverse of this occurred.

There are limited data on sport fishing for this drainage. Harvest data for the South Fork Fortymile River are based on a postal survey questionnaire. It indicated that 22 anglers fished 31 days and harvested 45 grayling (Mills in prep.), and does not account for catch-and-release fishing. Johnson (1980) and Webb (1979, 1980) sampled grayling below the Kink and recorded a range from

Fortymile River *Placer Mining*
FINAL
Cumulative Environmental Impact Statement

Fisheries



Legend

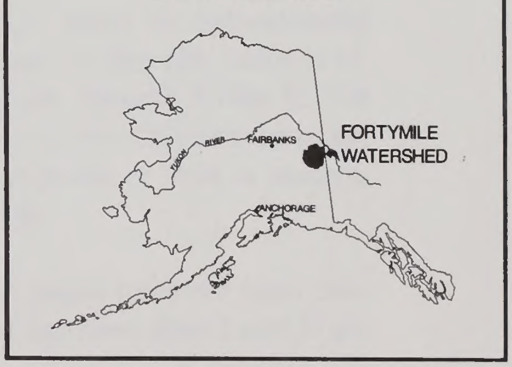
- Arctic Grayling
- Slimy Sculpin
- Round White Fish
- Chinook Salmon
- Chum Salmon

The presence of the following fish species has been recorded at the indicated sites.

- Automated sampling site
- Non-automated sampling site

Water samples were taken in 1987 at the indicated monitoring stations.

LOCATION MAP



13.5 hours of effort to catch ten fish for a catch rate of 0.74 fish per hour, to 5.8 hours of effort to catch 206 fish for a catch rate of 35.8 fish per hour.

Stream surveys by BLM and ADF&G reported sedimentation and cementing of the streambed in Chicken Creek. The creek does not support a fishery, because it lacks spawning areas, cover, and aquatic invertebrates.

The streambed at the mouth of Uhler Creek is composed of gravel heavily laden with sand, forming a compacted streambed with little habitat available for benthic organisms. It is not known if the entire Uhler Creek has this stream bottom condition or if it was a result of natural conditions.

3.8 Cultural Resources

3.8.1 Prehistory

Based on Cook's (1975) generalized summary, known sites in Interior Alaska can be placed into broad categories: 1) historic or late prehistoric Athabaskan occupations, 2) an older cultural stratum which may be early or ancestral Athabaskan, and 3) a vaguely defined earlier period.

Hopkins (1967) concludes that during the late Wisconsin glaciation (maximum extent 18,000 years ago), Alaska and Siberia were part of a single continental land mass known as Beringia. Much of ice-free Interior Alaska at that time consisted of a steppe-tundra environment (Ager 1975) which supported such animals as bison, horse, and mammoth (Guthrie 1968). Due to the presence of these large game animals, the land presumably supported people.

West's work (1981) in Interior Alaska has resulted in the definition of an important artifact assemblage known as the Denali complex. This complex is dated between 11,000 and 8,000 years ago and contains such characteristic elements as distinctive wedge-shaped microblade cores, microblades, burins made on flakes (Donnelly burins), biconvex bifacial knives, blades, and tchithos or spall scrapers. Components of this complex are widespread in Alaska, having been found from the Kobuk River to the Alaska Range.

One of the earliest firmly dated Interior Alaska sites, Dry Creek, dates to approximately 11,000 years before present. (Thorson and Hamilton 1977). Component I of this site, which is located along the northern flanks of the Alaska Range, contains cultural material similar to that found in the lowest levels of a site at Healy Lake. This material, known as the Chindadn complex, differs from the Denali complex in that a different form of bifacial projectile or knife is present. Chindadn points date between 11,000 and 9,000 years ago (Cook 1975).

Although the cultural affinity of these artifacts and their faunal associations have not been confirmed, artifacts in central Alaska which date as early as 11,000 years ago have been found in association with Pleistocene megafauna at such sites as Dry Creek.

At some sites there appears to be a continuity into the next period of use, when a wedge-shaped core complex of largely local material appears at several sites throughout the Interior. This "Denali complex" material, dated about 6,000 years ago, contained wedge-shaped microblade cores similar to those at the "Campus" site. Burins have also been found in this level, in addition to corner-notched and expanding stem points and a variety of scrapers (Cook 1975).

Apparently between 3,500 to 5000 years ago, Tuktu-Palisades Complex material was deposited. This complex has been found at widely scattered locations from the Brooks Range and throughout Interior Alaska. The material is characterized by distinctive Tuktu type cores, side-notched and lanceolate points, microblade cores with burin blows, and a variety of scrapers. This complex differs from the other two in both artifact form and in the use of non-local material.

A prehistoric site located near the Walker Fork campground was tested in 1983 and may well be related to this complex. Side-notched points and a few microblades were found. Prior to excavation, the site was disturbed by suction dredgers (Cook, pers. comm. 1988).

More recent sites that can definitely be linked to the Athabaskan culture in the historical present include Dixthada, Healy Lake, Minchumina, and sites along the Porcupine River in Canada.

Work by Le Blanc at the Rat Indian Creek site along the Porcupine River in the Yukon Territory indicates that the site can be integrated into the existing prehistoric framework for the northern Yukon and other areas of the western subarctic (Le Blanc 1984). He proposed two phases which accommodate the components at Rat Indian Creek as well as other middle Porcupine sites. The Old Chief Phase extends from about 900 B.C. to A.D. 700, while the Klo-kut Phase begins about A.D. 700 and continues through the arrival of European traders. The latter includes the level five component at Rat Indian Creek and the prehistoric levels from the Klo-kut site. The Klo-kut site, a stratified Athabaskan site in the Yukon Territory, was occupied throughout the last 1,000 to 1,500 years (Morlan 1973).

Le Blanc's conclusion about these site comparisons describes a relationship referred to as the "Athabaskan Tradition" that has components found in several sites throughout Alaska and Canada. Collectively, these late prehistoric manifestations can be considered as a broadly defined technocomplex spanning the period from roughly A.D. 700 to the mid-nineteenth century (Le Blanc 1984).

Two sites inhabited by the Tanana people until the late 1800's include Joseph and Ketchumstuk. These sites were probably occupied historically and may prove significant with future research.

According to Cook (pers. comm. 1988), numerous surficial flake sites have been disturbed by or near State gravel pits along the Taylor Highway, at several isolated locations near the junction to Boundary, on Stonehouse Creek, above Lost Chicken Creek, along the North Fork, and in the basin area of the upper Middle Fork drainage. The latter was the traditional route from the Tanacross/Healy Lake area into the headwaters of the Fortymile River drainage. Cook also stated that a traditional obsidian source was located in the headwaters of the North Fork drainage but

has not been relocated. Cook noted that a local miner told him that a hearth and large biface were uncovered years ago during hydraulic stripping operations at the mouth of Napoleon Creek.

None of the prehistoric sites have been determined eligible for the National Register of Historic Places. There are no World Heritage sites in the area; the nearest is Wrangell-St. Elias National Park on the Alaska-Canadian border to the south.

3.8.2 Ethnographic History

The Fortymile River drainage was apparently a boundary area and was probably used primarily by Tanana people (who also utilized the Tanacross area of the Tanana River valley) as well as the Han people who occasionally joined the Tanana in communal caribou hunts. Boundaries and groups were hardly formal in pre-contact times and were based primarily on the availability and need for resources by these highly mobile people.

Prior to the arrival of non-Native people, the major resource used by the Tanana was undoubtedly caribou. Following this was fish, which were taken with nets and weirs from the clearwater streams and small lake outlets in the Tanana valley, with lesser importance being placed on moose, sheep, muskrat, beaver, and waterfowl (McKennan 1981). The same is true of the Han except that they obtained salmon along the Yukon.

After drying and caching fish, the late summer and fall was the time to prepare for caribou hunts in the neighboring uplands. Fences and snares or "surrounds" were located in the upland country of the Fortymile River drainage to intercept the migrating animals. This communal activity frequently provided enough meat to be cached. Small winter "villages" or base camps in the uplands were used during most of the fall and winter. Former communities at Joseph and Ketchumstuk are examples of these. During the coldest weather, cached meat and fish were retrieved from storage sites.

Moose were taken in the lean times of late winter and early spring. In spring, beaver and muskrat became increasingly important as food sources, necessitating a return to the smaller lakes and ponds near the Yukon (for the Han) and near Healy Lake and Tanacross (for the Tanana). The return of waterfowl to these flats and their subsequent moult made them important game in the early summer.

During summer, the Han occupied villages and fish camps along the Yukon where salmon were available. Charley's Village (above Eagle), a camp at Mission Creek near Eagle, and a village at the mouth of the Fortymile were Han communities.

Salmon rarely reach the Tanana River above the Goodpasture, so they were not a major food source for the Tanana people, but whitefish, grayling, northern pike, burbot, and sheefish were taken. Before introduction of the fish wheel in 1903 most fish were taken with traps, weirs, or nets in the clearwater drainages and outlets of small lakes in the flats.

Since all wildlife resources are subject to fluctuations and changing migration patterns, feast or famine and varying human populations sometimes resulted. Fish camps or caches of a few family or band members were probably located along the major clearwater streams and winter encampments or single hunting sites at strategic locations along the drainages and in the adjacent uplands of the Fortymile drainage. Any high point could be a reasonable hunting lookout, and obsidian outcrops as sources for raw material have been reported for the Middle Fork drainage (Cook, pers. comm. 1988).

These patterns were disrupted after contact (although to some extent this took place as early as the 1700's as the coastal-interior trade network for goods from Siberia was established) with increased dependence on trade goods and fur trapping. Initially, a prime factor in the seasonal cycle was trading, which usually meant being at Fort Yukon or Nuklukayet (at the confluence of the Tanana and Yukon rivers) in early summer. Both the Han and the Tanana people traveled to these sites to trade. Increased dependence on trade items and the resource shift to furbearers meant more extensive traplines and a greater need for dog food. The Upper Tanana depended heavily on caribou and whitefish to support dogteams. With the introduction of the fishwheel, the Han shifted their fishing emphasis to the larger silt-laden Yukon for salmon, and the Upper Tanana utilized the Tanana River for whitefish. Increased exploitation took place in the flats adjacent to these rivers where furbearers were available. Caribou hunting decreased with a greater emphasis placed on moose as a food resource, partially due to the shift from communal activities to more individual resource gathering, such as trapping. Starting in the late 1800's the caribou populations declined in the Fortymile River drainage and moose became more important as a source of year-round food, as well as fish, muskrat, beaver, and migratory waterfowl (Hosley 1981).

The goldrush to the Fortymile River in 1887 had the most significant impact on the Native history of the Fortymile drainage. The communities of Joseph and Ketchumstuk were abandoned shortly after the discovery of gold as people moved to communities such as Eagle Village, Chicken, and Tanacross.

3.8.3 History

By the time the Russians established the redoubt at Nulato in 1838 trade goods had already made their way upriver from the lower Yukon. The Tanana and Han people traded at Fort Yukon, which was established by the Hudson's Bay Company in 1847, as well as at the confluence of the Tanana and the Yukon at a site known as Nuklukayet, and later at the post established at Tanana which was also called Nuklukayet (Allen 1887).

Despite this, when Lt. Henry Allen traveled down the Tanana during late June 1885, he saw very few Natives, and stated that "Had we started down the Tanana two weeks earlier the probabilities are that we would not have seen a single native on the river. It must be remembered the Nandell's, Tetling's, and Kheeltat's [Tanana headmen] people live on small streams away from the river, as do probably all the inhabitants during the springtime" (Allen 1887).

Sometime between 1880 and 1883, Al Harper and a Mr. Bates went overland from David Camp (near Eagle) to the Tanana (McQuesten 1952). Harper did some prospecting on the North Fork of the Fortymile but all he got was sand. Bates saved this sand and found it assayed at $20,000 a ton. However, when Harper returned the following winter he either could not find the location or the gravel had been carried away by the ice (McQuesten 1952).

In 1886 Howard Franklin went up the Fortymile River, or "Shitando" as the Natives called it, from Jack McQuesten's trading post at Fort Reliance on the Canadian side of the Yukon, and discovered coarse gold in the river bars about 25 miles above the mouth (Brooks 1953). This location was significant because it was the first important discovery within the U.S., located approximately where Moose Creek enters the river. With no desire to keep these discoveries secret, the word spread rapidly to the Stewart River prospectors and triggered the first major gold rush into the country.

After this discovery, Harper, who was a partner with McQuesten and Mayo for the Alaska Commercial Company, realized that additional supplies would be needed for these miners. A letter was sent out to McQuesten, who had already gone to San Francisco for the winter. George [or Tom] Williams, a former riverboat captain, and an Indian companion [Indian Bob] volunteered to carry the mail out overland via Chilkoot Pass. Williams died enroute but the letter got to McQuesten who brought in enough supplies the following spring to establish a post at Fortymile, at the confluence of that river and the Yukon (Goodrich 1898).

It is interesting to note that there are varying accounts of the dates and locations of the Fortymile gold discoveries, both of Franklin's initial one on the bar near Moose Creek and of the Franklin Gulch find.

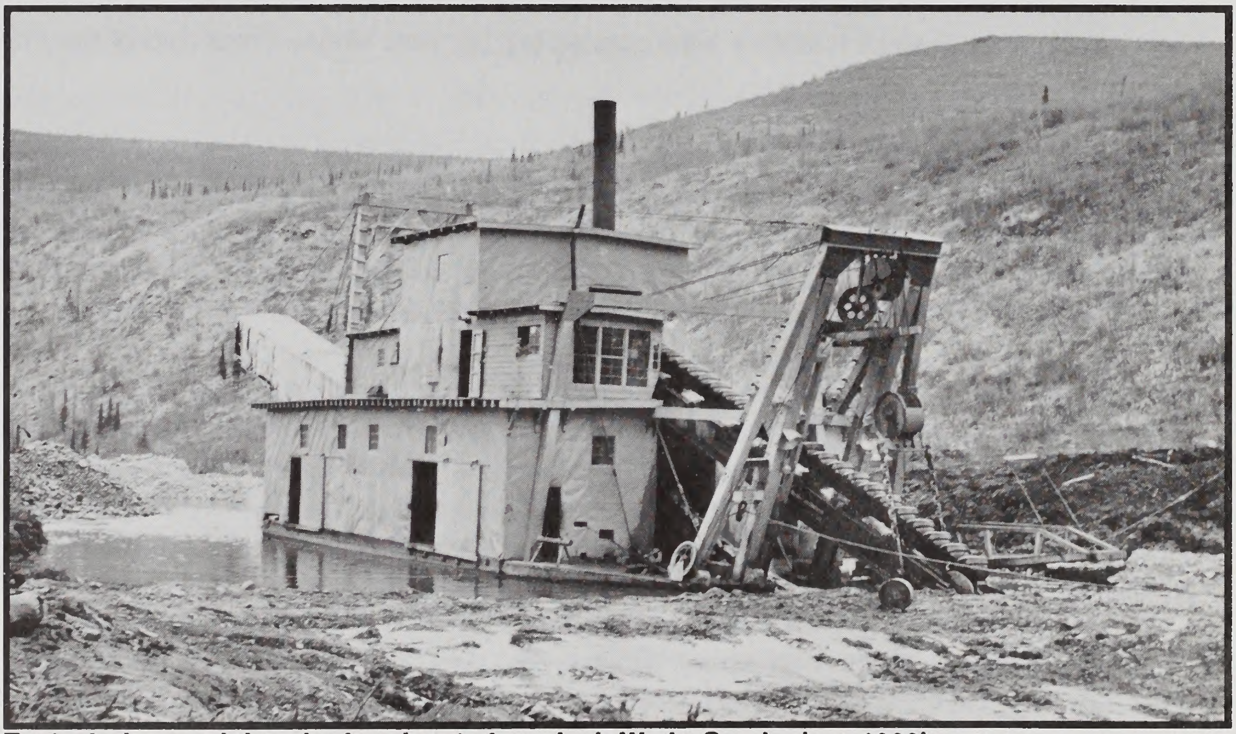
Apparently gold was first found at Franklin Gulch on the South Fork of the Fortymile River in the fall of 1887. According to Goodrich (1898) the area was named in honor of the first discoverer of gold on the Fortymile. Subsequent strikes were made at Davis Creek (1888), Poker Creek and the headwaters of Walker Fork (1890), Miller and Glacier Creeks, which are in Canada (1892), Dome Creek (1893), Napoleon Creek (1893), Wade Creek (1895), and Chicken Creek (1896).

It is estimated that, in the first year after discovery, $4,000 worth of gold was taken out of Franklin Gulch. Since the gulch was short and narrow and the ground shallow, the miners decided that the standard claim size would be reduced in order to accommodate more miners. By 1896, Franklin was losing population to the Klondike, but the area was inhabited continuously from 1887 through 1948. It maintained a post office from 1902 until 1945 and a school from 1927 until 1933. At one time the mouth of the gulch was known as Dogtown because of the vast number of sled dogs. During its peak in the late 1800's the population was about 200 people. The roadhouse, which had been rebuilt three times, was the focal point for social activity for miles around. Sunday dinner, the post office, and John Powers' stopovers with news, mail, and freight made it an important spot (Bonewitz 1977). The Steele Creek Roadhouse was placed on the National Register of Historic Places in 1980.

Wade Creek was named for Jack Wade, who discovered gold there in 1895. A post office was established in 1901. The "community" of Jack Wade was mainly the collection of cabins along the entire creek, although a post office and U.S. Commissioner's residence were located at the mouth of Jefferson Creek. The creek has been called Cole Creek for Charles Cole, who served as the postmaster from 1910 to 1914 and from 1916 until his death in 1935. He was also the U.S. Commissioner (Haynes 1976). Other individuals who served as postmaster include Bert Green and Frank Pratt. With the decline of mining activity following World War II, the postal service ceased delivery to Jack Wade in 1948.

Other miners in the Wade Creek area included Jimmy Morris, A.A. "Mac" McCandless, Charlie "Deep Hole" Johnson, and Andy Lassen. The latter owned several of the rich claims at the lower end of Wade Creek. Until the 1920's mining on Wade Creek was primarily by winter drifting and summer sluicing of the piles. Charlie Martin used a scraper in 1920, but it was not particularly successful (Haynes 1976).

It is possible that as early as 1891, prospecting took place in the Chicken Creek area. According to Prindle (1906), Frank Krell was mining on Meyers Fork that year. By 1896 there was a definite rush to the Chicken Creek area after Bob Mathieson found gold on upper Chicken Creek (Haynes 1976). A small community developed near the mouth of the creek and in 1903 a post office was established. Mail was delivered from Eagle every ten days by John Powers, who freighted with horses until 1938. In the winter of 1938-39 delivery was by dogteam but the following year saw the first delivery by airplane.



Typical placer mining dredge, located on Jack Wade Creek circa 1920's. Photo courtesy of the Anchorage Museum of History and Art.

By 1906 the population stood at about 400 and a roadhouse was built by Harvey Van Hook near John Powers' barn and trading post. The Taylor Highway to Chicken was completed in 1949 and Eagle and the Fortymile ceased to be the major link for supplies, except by plane (Haynes 1976).

The Fairbanks Exploration Company bought most of the claims in the area of Chicken and began preparation for mining in 1953. In 1959 the Pedro dredge #4 was moved from Fairbanks to Chicken and operated until 1967 (Boswell 1979).

Discovery of gold on Birch Creek in 1893 encouraged McQuesten to establish a trading post at Circle to accommodate the stampede of miners from the Fortymile District. Although a few filtered back as the Birch Creek claims were staked, the report of gold discovered on the Klondike in 1896 sparked another stampede to that country and Fortymile was again deserted. To quote Goodrich (1898), "Messrs. Harper and Joseph Ladue, traders at Fort Selkirk and Sixtymile, are the founders of the new camp [Dawson], which is expected to rival the older settlement." But the Fortymile District was not totally deserted.

The Steele Creek roadhouse was built by a Mr. Anderson in 1898. He ran it until 1908 when it was purchased by John A. Kemp who operated it with his wife until 1932. Harry Ross ran it until 1938 when it changed hands again. In 1948 it was purchased by Robert and Ruth Wilson. They operated it until the mid 1950's. In 1964 the roadhouse and mining claims were purchased by Neil Thurneau who lived there for several years. Steele Creek had a series of postmasters from 1907 until mail was transferred to Boundary in 1951 (Bonewitz 1977).

In 1899 a young Dane, Johannes Petersen, his brother, Emil, and several other men went up the North Fork of the Fortymile River, 20 miles to a location known as the Kink. At this point the North Fork meandered two and three quarters miles around a rocky ridge. After prospecting the area, Petersen theorized that if a channel were blasted through the base of the 100-foot ridge the meander might yield up its gold. By the fall of 1900, the gap was complete and the river was rechanneled. The gold potential looked good before freeze-up. But in the spring of 1901 rock began falling and the channel had to be reopened. By 1902 Petersen and his brothers had sold out their holdings and moved on. For years the hole in the ridge stood, a silent monument to early miners' efforts. The site was placed on the National Register of Historic Places In 1975. In 1982 Petersen's son brought his father's original letters and photographs to Alaska which documented the work done to reroute the North Fork at the Kink (Trimble 1975, Mitchell 1988).

Although early prospectors used goldpans and rocker boxes or cradles, most early mining in Alaska involved sinking holes to bedrock, where the heavy gold had settled out of the alluvial material. Thawing the ground was done by wood fires, hot rocks, hot water, or steam points. The dirt was excavated with a pick, shoveled Into a bucket, and hoisted to the surface with hand windlasses (Prindle 1906). Depending on the availability of water, the dump would then be sluiced and the gold collected from the riffles of the sluice boxes.

Drift mining, where the deeper gravels were mined, involved sinking a shaft 20 to 120 feet, timbering it and the horizontal drifts running from the shafts along the paystreak, then hoisting the paydirt to the surface for sluicing (Prindle 1906). This technique, the most common one, was

usually undertaken during the winter when the solidly frozen ground provided additional support, especially since wood was frequently scarce. The dump of hoisted paydirt would then be sluiced during the summer when melted streams provided the needed water.

Open-cut mining was limited to the few locations where the gold-bearing material was shallow, mainly in the headwaters of the creeks. This was accomplished by removing the overburden and then constructing bedrock drains into which sluice boxes were set. The boxes were either moved up the valley as material was sluiced, or the gravel was hoisted into boxes which were set off to the side (Prindle 1906).

Mining was highly dependent on water availability. Prior to 1905, no extensive ditching was done and any water used for sluicing came from the creek being mined (Prindle 1906).

In 1907, a dredge began operating at Twelve Mile Creek on the Walker Fork. This dredge, installed by a wealthy Englishman, Russell King, was freighted up the Fortymile River from Dawson. In 1909 it was moved down the South Fork of the Fortymile River and worked upstream from Uhler Creek to Franklin Creek. Known as the Mulvane Dredge, after its operator Bob Mulvane, it ceased to be profitable above Franklin Creek and was shut down in 1914. In the spring of 1935 it was purchased by the North American Mining Company of Boston and moved to upper Wade Creek (Bonewitz 1977).

New timbers were replaced in the hull and a new bucket line was put on. The buckets were shipped by rail from Cordova to Chitina, then trucked to Chistochina and flown one by one to Lassen Field at the confluence of Wade Creek and Walker Fork (Bonewitz 1977).

The North American Mining Company operated the dredge until December 1940 when it was sold to the Wade Creek Dredging Company for $60,000. They converted the steam engines to diesel. After the digging ladder broke for the second time in 1941, the dredge was shut down. The Yukon Placer Company used many of the working parts for dredges in other areas (Bonewitz 1977).

Prior to dredging, the ground had to be drilled to determine the depth of overburden, gravel, and gold prospects; drains had to be put in and the muck or overburden had to be hydraulically stripped; then the gravels had to be thawed using points driven the previous winter that water was flushed through in the spring (Boswell 1979).

In its operating days, the dredge at Jack Wade could be run by a winchman, an oiler, and a fireman, but it required a crew of woodcutters to provide the ten to twelve cords of wood needed each day it ran. Running 24 hours a day from June through October, about 1,500 cords of wood were used. Between 1940 and 1941, the Wade Creek Dredging Company recovered $120,000 worth of gold with the dredge (Bonewitz 1977).

By the late 1920's bulldozers were introduced. World War II closed down all mining in the district as non-essential to the war effort, and the government confiscated the heavy equipment. A few bulldozers were used after the war, but by the 1960's mining was virtually non-existent due to the low price of gold. However, the rapid rise in gold prices in the 1970's brought renewed activity.

Such equipment as bulldozers and front-end loaders came into use to strip the overburden and push gravel into sluice boxes.

3.8.4 Paleontology

By the turn of the century early mining and prospecting probably had some impact on the discovery and recovery of fossils in the smaller drainages of the area where most of the Quaternary alluvium exists. However, the introduction of hydraulic stripping and dredge mining during the 1920's and 1930's, which moved large quantities of frozen overburden or muck, resulted in significant fossil discoveries at Ingle Creek, Chicken Creek, Jack Wade, and particularly at Lost Chicken Creek (Lindsey 1986).

There is a possibility for further discoveries during mining operations, although past mining techniques (e.g., hydraulic activity) were not as destructive to such fragile specimens. Hydraulic stripping still takes place at Lost Chicken Creek which has resulted in recovery of such significant Pleistocene animal bones as elk, sheep, large cat, mammoth, mastodon, wild ass, muskox, saiga antelope, and bison (Lindsey 1986). In the event of future hydraulic operations there is good potential for additional Pleistocene animal recovery.

Work on Pleistocene animal material possibly recovered from Wade Creek suggests the possibility of human butchering (Porter and Hopkins 1979). Any discovery of additional animal material in the Wade Creek drainage may be very important.

3.8.5 Discussion

Knowledge of prehistory in Interior Alaska is limited. The remoteness of the country and scarcity of sites combine with dense vegetation and permafrost to make cultural resources generally difficult to find.

There is a curious relationship between mining and cultural resources. On one hand, mining has promoted understanding of the past because of artifacts collected from sluice boxes, fossils exposed during hydraulic stripping, and site locations identified during exploration or prospecting. On the other hand, mining operations often destroy cultural material. Current mining practices are much more destructive than early day techniques. And ironically, today's mining often destroys evidence of earlier mining which may, in itself, be of historic interest.

Most mining today takes place on previously disturbed ground. This trend is likely to continue for some time with the development of improved gold recovery techniques. Most of the damage to cultural and paleontological resources has probably already taken place in the drainages currently available for mining.

3.9 Subsistence

Population of the Fortymile River drainage is sparse, with seven villages associated with the Fortymile River: Eagle (including Eagle Village), Chicken, Dot Lake, Northway, Tanacross, Tetlin, and Tok. The latter five are on the Tanana River and the Alaska Highway, and Eagle is on the Yukon River. Chicken is the only village on the Fortymile River; it is also on the Taylor Highway. Jack Wade and Boundary are the two locales on the Top of the World Highway.

The Alaska Department of Fish and Game (ADF&G 1986c) has estimated statistics for socioeconomic profiles of the villages. In 1984, the combined population of Eagle and nearby Eagle Village was 227, with 35% Alaska Native; Chicken was 38, with 3% Native; Dot Lake 69, with 57% Native; Northway 191, with 61% Native; Tanacross 148, with 86% Native; Tetlin 110, with 97% Native and Tok 608, with 15% Native. Taxable income for the same year was $421,127. Per capita harvest levels of subsistence resources are 86 pounds in Tanacross, 107 in Chicken, 144 in Tok, 242 in Eagle, 272 in Dot Lake, 275 in Northway, and 424 in Tetlin. Roughly 50% of the households in the Eagle area depend significantly upon subsistence (ADF&G 1986c).

3.9.1 Ethnography and History

The area has been associated with three groups of Athabaskan Indians, the Han Kutchin based at Eagle, the Tanana along the Tanana River downstream from Tok, and the Nabesna along the upper Tanana. Prior to European contact these people lived in scattered settlements occupied seasonally (Slobodin 1981). Once trading posts were established along the Yukon River, Native lifestyles began to change in response to European demand for furs (Slaughter n.d., Caulfield 1983). Two former winter caribou camps, Kechumstuk and Joseph, are located in the drainage (McKennan 1981); both have been abandoned since the entry of whites into the area.

The Gold Rush period beginning in the late 19th century affected traditional subsistence patterns even more, resulting in near extermination of big game populations (DOI 1973a). Fire also reduced or redistributed wildlife. Fish became the basic subsistence item, both as a result of the absence of other species and of the need to feed dog teams (McKennan 1969). While wildlife populations have recovered to a large extent, the Natives associated with the Fortymile River area fulfill most of their subsistence needs in the Yukon or Tanana River drainages (Case 1986, Haynes et al. 1984, Martin 1983).

3.9.2 Current Subsistence

The Fortymile River drainage supports a variety of big game, fish, furbearers, and waterfowl that can be used for subsistence. Northern pike, whitefish, burbot, and grayling are present through most of the Fortymile River and its tributaries. Furbearers include marten, fox, wolverine, beaver, otter, and lynx. Various duck and goose species breed and nest in portions of the Fortymile River drainage. Wood is available for construction and fuel, and blueberries and cranberries are found in the area.

Caribou

3.9.3 Affected Subsistence

Caribou

Caribou are an important subsistence species because of the amount of meat provided, and because much of the rest of an animal is used for clothing and other purposes. People from Northway go up the Taylor Highway to hunt caribou from the Fortymile herd (Case 1986); people from Tok, Chicken, and Eagle also hunt the Fortymile herd. People from Northway (Case 1986) and Tetlin (Halpin 1987) also hunt in the Tetlin National Wildlife Refuge (USFWS 1987), in the Ladue River drainage (Case 1986), or south on the Macomb Plateau (Martin 1983). People from Eagle traditionally take caribou from the Porcupine herd (Caulfield 1983). See Subsistence Map One for caribou and moose hunting areas.

Available data from a small sample of Northway residents indicate that 29% of the households in Northway participate in caribou hunting, with 21% of those successful (Case 1986). Participation in caribou hunting in the other Tanana villages ranges from eight residents in Dot Lake to 373 residents of Tok in the Fortymile herd; harvest records are not available (ADF&G 1986c). During the 1981-1982 season, residents of Eagle harvested 300 caribou (Caulfield 1983).

A study of the history of the Fortymile area done in the 1970's (Haynes 1976), indicates that the easy access provided by the Taylor Highway has led to increased harvest of caribou and other game species in the area.

Moose

Moose are replacing caribou as the primary subsistence big game species, largely because they are more available closer to the villages, and because of the variations in caribou herd population and migration routes (Case 1986, Caulfield 1983). The primary use of the Fortymile River drainage for subsistence moose hunting is by residents of Northway, Chicken, and Eagle; use by residents of Tok, Tanacross, Tetlin, and Dot Lake is reported (ADF&G 1986c). Out of 13 households in Northway in 1983-84, eight were successful in harvesting moose (Case 1986). Most likely, the number of moose harvested for the community of Northway was higher. The Taylor Highway provides access to moose hunting areas in the Fortymile River drainage.

Trapping

Trapping occurs in the Fortymile River drainage by people from all associated villages. Most people in the other villages to the south, trap along the Tanana River and its tributaries (ADF&G

1986c, Case 1986). All households participating in trapping in Northway reported harvesting muskrat (Case 1986). Harvest of beaver is limited to 25 per trapper by Alaska game regulations. Three households from Northway reported beaver harvests in 1983-84 (Case 1986). Lynx and wolf are also trapped (Case 1986). See Subsistence Map Two for trapping areas.

Fish

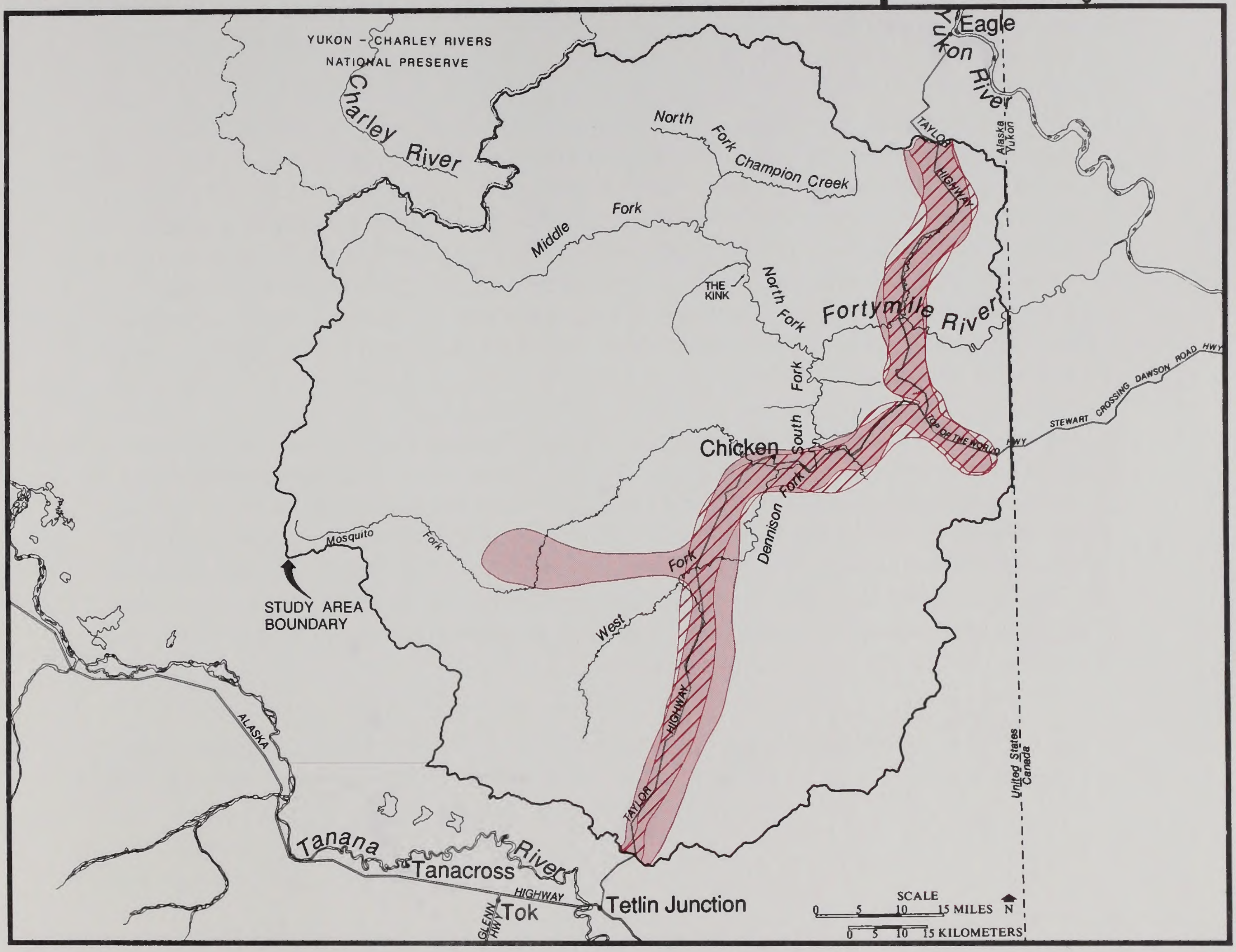
Fish species present in the Fortymile River system include grayling, slimy sculpin, sheefish, round and humpback whitefish, and a few chinook and chum salmon (ADF&G 1987a). However, populations are not well documented either before or after the occurrence of placer mining (ADF&G 1987a). Turbidity and sediment loads in the Fortymile River can be high in areas of placer mines, wildfires, and road maintenance (DOI 1973a, ADF&G 1987a). It has been suggested that fish populations and availability can thus be reduced. Additionally, streams in mining areas may have blocked channels, perhaps preventing some fish from reaching spawning grounds (ADF&G 1987a).

Subsistence fishing is apparently limited on the Fortymile River. Rather than using the Fortymile area, residents of Northway and other villages to the south fish in the Tanana River (Case 1986), the Copper River (Haynes et al. 1984), and nearby smaller streams and lakes, or they travel to the Yukon River near Eagle to fish (Case 1986). Residents of Eagle fish primarily in the Yukon River and streams and lakes to the north, although there is some fishing in the Fortymile area. No fishing data exist for residents of Chicken. It is not known if the absence of subsistence fishing in the Fortymile River system is due to the absence of appropriate fish populations, or if the more localized environments are simply more accessible.

Many villages depend on fish for subsistence use. Bureau of Land Management.

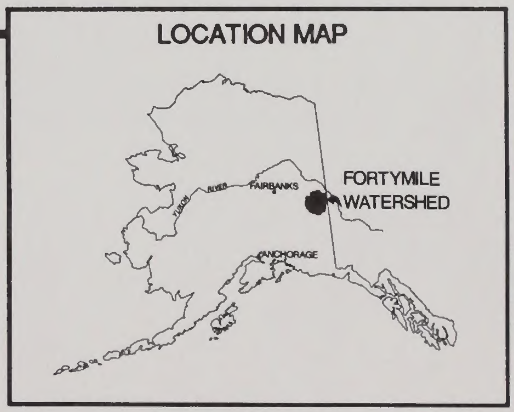
Subsistence Uses Within the Fortymile River Drainage:

Moose Hunting
Caribou Hunting



Legend

- Moose hunting area
- Caribou hunting area

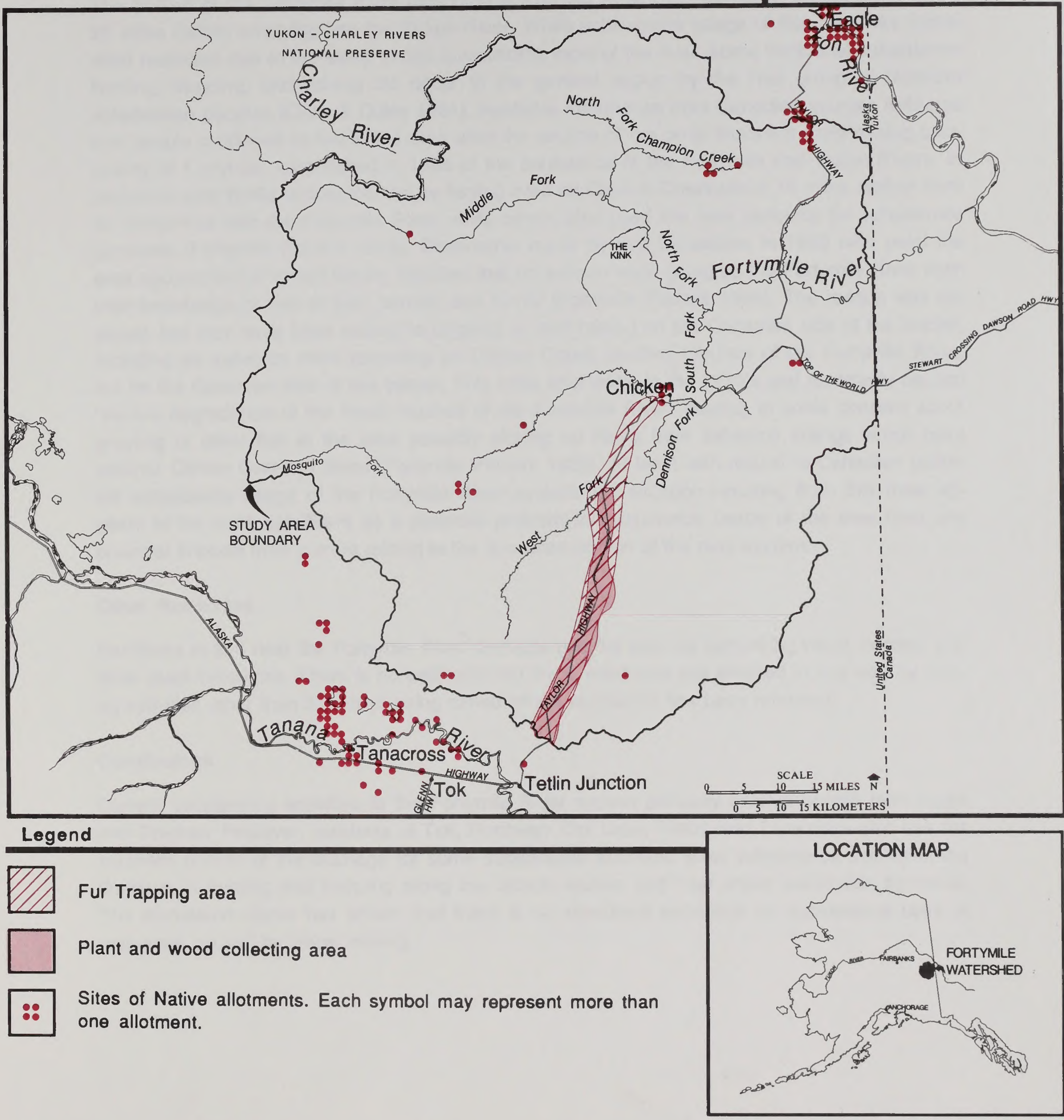


Note: Data derived from Case (1986) and Halpin (1987). Subsistence use areas depicted are based on information obtained from a sample of community households; subsistence patterns of household resource use may change from year to year while information is collected for specific periods. Therefore, all maps can be considered potentially only a partial representation of areas important to local village residents.

Note: This map includes data from the following communities only: Northway, Chicken, Eagle and Tetlin.

Subsistence 2 of 2

Native Allotments and Subsistence Uses within the Fortymile River Drainage: Plants and Fur Trapping



Note: Data derived from Case (1986) and Halpin (1987). Subsistence use areas depicted are based on information obtained from a sample of community households; subsistence patterns of household resource use may change from year to year while information is collected for specific periods. Therefore, all maps can be considered potentially only a partial representation of areas important to local village residents.

Note: This map includes data from the following communities only: Northway and Tetlin. Data not available for Chicken or Eagle.

Subsistence Uses of the Canadian Portion of the Fortymile River System

The portion of the Fortymile River extending across the American- Canadian border flows about 25 miles before emptying into the Yukon River. While subsistence usage of this area was somewhat restricted due to the steep terrain surrounding most of the river, some traditional subsistence hunting, trapping, and fishing did occur in the general region by the Han group of Northern Athabaskan peoples (Crow & Obley 1981). Available information from Canadian sources indicates that people continued to live in the area after the decline of the once important early mining community of Fortymile, established in 1886 at the confluence of the Fortymile and Yukon Rivers. In particular, one family is documented as having lived on Cassiar Creek about 16 miles upriver from its confluence with the Fortymile River, while others also used the area variously for subsistence purposes (Fortymile Placers 1988). Statements made by two Canadians in 1983 who used the area apparently for limited fishing reported that no salmon were going up the Fortymile River from their knowledge or that of their parents and family (Fortymile Placers 1988). The reason was not stated, but may have been related to ongoing or past mining on the Canadian side of the border, including an asbestos mine operating on Clinton Creek, another tributary of the Fortymile River, but on the Canadian side of the border. This mine shut down in the 1970's and reportedly caused "severe degradation of the lower reaches of the Fortymile River" leading to some concern about grayling or other fish in the area possibly picking up fibers from asbestos tailings which have entered Clinton Creek at times (Fortymile Placers 1988). At least with regard to Canadian potential subsistence usage of the Fortymile River system, the situation resulting from this mine appears to be more significant as a potential problem to subsistence usage of the area than any potential impacts from current mining in the American portion of the river system.

Other Resources

Residents in and near the Fortymile River drainage use the area for harvesting wood, berries, and other plant resources. There is no evidence that these resources are affected in any way by mining activities other than the areas being mined where vegetation has been removed.

Conclusions

Current subsistence activities in the Fortymile River system primarily involve people from Eagle and Chicken. However, residents of Tok, Northway, Dot Lake, Tetlin, and Tanacross also use the southern portion of the drainage for some subsistence activities. Most subsistence activity in the drainage is hunting and trapping along the stream system and near areas accessible by roads. The discussion above has shown that there is no significant restriction on subsistence uses or resources caused by placer mining.

3.10 Recreation and Visual Resources

3.10.1 Recreation

Access

The Alaska Highway skirts the southern edge of the affected area, and provides access from Anchorage, Fairbanks, and the lower 48 states. At Tetlin Junction the Alaska Highway meets the southern terminus of the Taylor Highway, which bisects the affected area. Besides providing access to the Fortymile National Wild, Scenic, and Recreational River, the Taylor Highway is a popular tourist route serving Eagle, Alaska and Dawson, Yukon Territory.

The Fortymile River basin is also accessible by air and water. Scheduled and chartered air service provides access to Tok, Northway, Tanacross, Eagle, and Chicken, which have improved airfields. Small planes can land on primitive air strips and gravel bars throughout the area. Air strips at Joseph and Slate Creek provide float boating access to the Middle and North Forks, respectively. Power boats travel the navigable segments of the Fortymile River system.

BLM Recreation Facilities

BLM recreation facilities are located along the Taylor Highway. Visitors can obtain information on a variety of subjects at the BLM operated field station at milepost 68, near Chicken. Service hours are maintained to meet the traveling public's needs.

A newly refurbished six-unit campground is located on the West Fork (milepost 49). An estimated 500 visitors registered in fiscal year 1987.

A small parking area and vault toilet located at the Mosquito Fork bridge, milepost 64.2, is used primarily by anglers, campers, and sightseers in self-contained recreational vehicles. Float and motorized boaters generally do not use the Mosquito Fork bridge area as a launch site for trips downstream. Boating up or downstream from the bridge is limited by shallow water and no boat ramp is available at the bridge site.

A boat landing with a parking area and vault toilet is maintained by BLM at the South Fork bridge (milepost 75.3). No use figures are available for this area, but it is a popular rest stop for people driving the Taylor Highway, as well as a staging area for motor boating and most recreational float trips. BLM plans to develop a small picnic area and interpretive kiosk at the site by 1991.

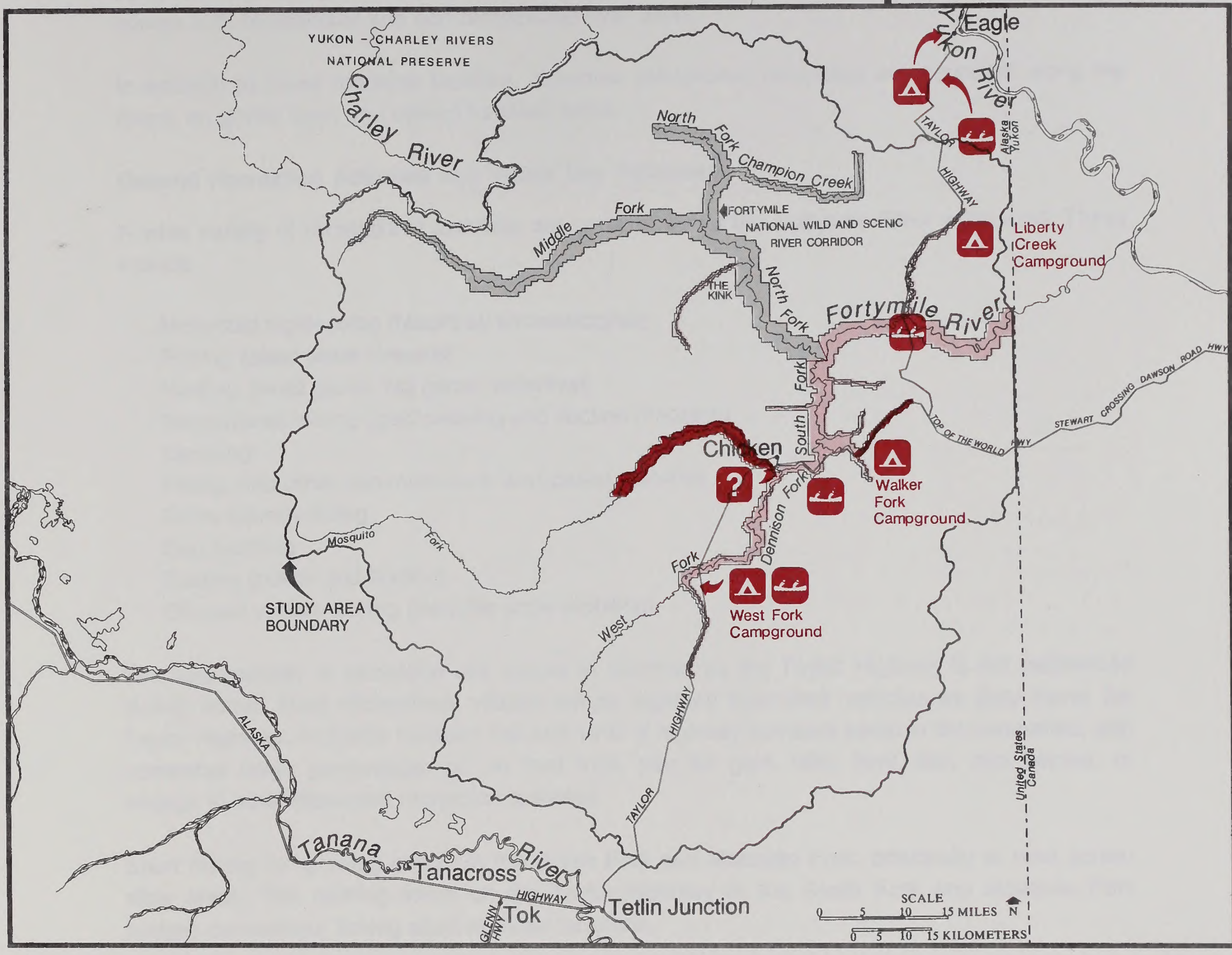
BLM maintains a 42-unit campground at the confluence of Wade Creek and Walker Fork (milepost 82), and a six-unit campground at Liberty Creek (milepost 131). In 1987, 1,750 visitors registered at the Walker Fork campground. About two-thirds of the registrants were either from Alaska or California. There is very little use of the Liberty Creek campground (50 campers registered in 1987).

Fortymile River Placer Mining

FINAL

Cumulative Environmental Impact Statement

Recreation



Legend

Designated Wild River segment

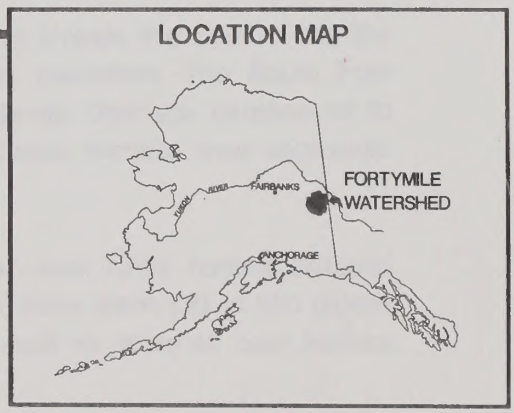
Designated Scenic River segment

Designated Recreational River segment

Put in/Take out site

Campground

Visitor Information



A popular terminus for float boaters is at the BLM-operated Taylor Highway facility located at the Fortymile River bridge, milepost 112.7. This site consists of a boat landing with a parking lot, and serves both recreational and non-recreational river users.

In addition to these roadside facilities, attractive unimproved campsites are abundant along the rivers, on gravel bars, and upland forested areas.

General Recreation Activities and Visitor Use Estimates

A wide variety of recreational activities are pursued within the Fortymile River watershed. These include:

- Motorized sightseeing (historical, archaeological)
- Fishing (clear water streams)
- Hunting (small game, big game, waterfowl)
- Recreational mining (gold panning and suction dredging)
- Camping
- Hiking, and other non-motorized, land-based activities
- Cross-country skiing
- Dog mushing
- Boating (power and floating)
- Off-road vehicle touring (includes snow mobiling)

The vast majority of recreation use occurs in summer, as the Taylor Highway is not maintained during winter. Most recreational visitors simply sightsee from their vehicles as they travel the Taylor Highway. Probably between 5% and 10% of highway travelers camp in the watershed, and somewhat lower percentages go on float trips, pan for gold, hike, hunt, fish, pick berries, or engage in other dispersed recreation activities.

Sport fishing for grayling occurs in the South Fork and Mosquito Fork, principally at road accessible areas. The parking areas on the Taylor Highway at the South Fork and Mosquito Fork bridges concentrate fishing effort at these locations.

Power boating takes place on the navigable river segments, which include the South Fork, the North Fork downstream from the Kink, and the Fortymile River mainstem. The South Fork receives the majority of recreational float boating use in the Fortymile drainage because of its ready accessibility via the Taylor Highway. Users must fly in to float the wild river segments, which tends to limit use.

Based on the return of harvest tags it is estimated that in 1987 over 1,000 hunters pursued caribou, the most utilized species in the river drainage. In addition, there were 200 to 250 moose hunters and 30 sheep hunters during the fall hunting season, as well as 30 to 40 bear hunters that utilize the area in spring as well as fall.

BLM compiles visitor use estimates only for the National Wild and Scenic River corridor; these are shown in Figure 3-6. With the exception of hunting use data collected by the Alaska Department of Fish and Game and presented above, recreation visitor use statistics for the Fortymile River drainage as a whole cannot be distilled from existing data. However, it is known that use levels are very light away from the Taylor Highway and the river system.

Activity	1987 Visits	1987 Visitor Use Days
Off-Road Vehicle Use	200	200
Other Motorized	3000	1000
Non-Motorized	500	200
Camping	2000	2000
Hunting	500	800
Site-Based	3200	500
Fishing	3000	800
Boating	200	1700
Other Water-Based	150	100
TOTALS	12,750	7,300

Figure 3-6. Estimate of Recreation Use, Fortymile National Wild, Scenic, and Recreational River, fiscal year 1987.

Floatboating the Fortymile

Floatboating visitor use estimates are developed by casual observation at the South Fork and Fortymile River bridge parking areas, observation of boating- related traffic on the Taylor Highway, and public contact at local BLM offices and campgrounds. Few recreational floatboating parties have been recorded during BLM river monitoring trips on Fortymile segments. The numbers that currently represent floatboat use are at best, speculative.

Travel time and distance from population centers is effective in limiting the level of floatboat use. To net between two to three days floating on the South Fork requires the following round trip logistics which includes parking a vehicle at the Fortymile River bridge.

From Fairbanks - Normally the round trip would require two vehicles driving 424 miles on pavement at an average speed of 50 mph for a total of 8.5 hours, and 224 miles (7.5 hours) on a gravel road at an average speed of 30 mph. The total of 648 miles takes 16 hours for each vehicle, which does not account for stopping enroute for additional fuel or other necessities.

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Floatboating the Fortymile

Floatboating visitor use estimates are developed by casual observation at the South Fork and Fortymile River bridge parking areas, observation of boating- related traffic on the Taylor Highway, and public contact at local BLM offices and campgrounds. Few recreational floatboating parties have been recorded during BLM river monitoring trips on Fortymile segments. The numbers that currently represent floatboat use are at best, speculative.

Travel time and distance from population centers is effective in limiting the level of floatboat use. To net between two to three days floating on the South Fork requires the following round trip logistics which includes parking a vehicle at the Fortymile River bridge.

<u>From Fairbanks</u> - Normally the round trip would require two vehicles driving 424 miles on pavement at an average speed of 50 mph for a total of 8.5 hours, and 224 miles (7.5 hours) on a gravel road at an average speed of 30 mph. The total of 648 miles takes 16 hours for each vehicle, which does not account for stopping enroute for additional fuel or other necessities.

From Anchorage - Normally the round trip would require two vehicles driving 720 miles on pavement at an average speed of 50 mph for a total of 14.5 hours, and 224 miles (7.5 hours) on a gravel road at an average speed of 30 mph. The total of 944 miles takes 22 hours for each vehicle, which does not account for stopping enroute for additional fuel or other necessities.

To float any other segment, except the West Fork of the Dennison requires more time, distance, and expense.

Boating enthusiasts usually expect good scenery, solitude, and exciting water. The floatable Fortymile segments have generally outstanding scenery and reasonable solitude, but little exciting water, although that does not preclude an enjoyable or interesting trip. Mining history and active mining in the area attract many recreational boaters who have an opportunity to watch gold recovery along the South Fork and Fortymile River segments and explore remnants past mining efforts. A common question is "Where can I watch them mine and pan for gold?" Most suction dredge operators allow panning on their claims, are willing to talk to floatboaters about mining, and have assisted recreational boaters involved in boating mishaps.

It is unlikely that most users float the Fortymile more than once because of the time involved and the desire to float a new river. However, some boaters enjoy the Fortymile area and make an attempt to float annually. Floatboating popularity of the Fortymile drainage can be expected to increase through a general increase in tourism and state population.

Effect of Mining on Recreation Opportunities

Previous mining in the Fortymile drainage has had both positive and negative effects on recreation. The historic mining district is a recreation attraction that draws many recreationists to the Fortymile. There are several abandoned mining sites and relics which are accessible from the highway. Old dredges, cabins, tools, and equipment are some examples of artifacts that draw the interest of visitors. Visitors interested in the area's mining history typically also enjoy the opportunity to compare the historic relics with modern mining operations. BLM's Walker Fork Campground, in the midst of extensive historic and current mining activity, receives considerable visitor use.

Placer mining has also negatively affected recreationists, principally boaters, anglers, and recreational miners. Conflicts developed during periods of peak suction dredging activity, notably in 1978 and then again in 1982, as miners and recreationists attempted to use the same areas. Heavy use existed from the South Fork Lodge on the Taylor Highway, downstream on the South Fork to approximately mile 15.9 at Uhler Creek. The South Fork and Fortymile bridge areas received extremely heavy use.

User conflicts were aggravated because neither BLM nor the State were adjudicating mining claims, due to the uncertainty over which agency was properly the manager of the riverbed. In 1983, BLM determined that most of the Fortymile riverbed was navigable, which initiated State management of mining claims there. Popularity of suction dredging has been declining since 1983, due to a variety of factors (see Section 3.2). BLM eventually closed the South Fork bridge

to overnight camping and other use by suction dredge miners. Conflicting use of the bridge areas no longer occurs, and user conflicts in general have now significantly decreased, compared to this earlier period of intensive, relatively unmanaged suction dredging.

Current impacts to float boating from suction dredging are caused mainly by the noise of the dredge in operation. BLM's long-term camping permit program has reduced competition between suction dredgers and recreationists for campsites, and has also reduced the number of social encounters between the two groups, by locating the long-term camps above ordinary high water, away from the shoreline.

Modifications to the river bottom from suction dredging create minor adverse impacts to both motorized and non-motorized recreational boating, and associated uses such as fishing. Dredge holes may not be visible to wading anglers or boaters, causing them to step in unexpectedly deep water. Suction dredge piles, if they are close to the surface, create an obstacle to boaters. These are short-term effects, since natural water action redistributes the displaced streambed materials.

Mining activity has also periodically visibly reduced water clarity, decreasing the quality of fishing and boating opportunities, and recreational gold panning.

3.10.2 Visual Resources

Historical Perspective

Before Congress conferred National Wild and Scenic River status on portions of the Fortymile drainage, the area affected by this EIS contained a variety of types of landscapes, with varying degrees of human influence evident. The EIS for the proposed designation of the Fortymile National Wild and Scenic River recognized this landscape diversity: "The environments of the proposal range from primitive with little evidence of man's activities (Mosquito, Middle and North Forks) to areas where there has been substantial modification (South Fork, O'Brien Creek, Wade Creek, and Fortymile River)" (DOI 1973a). As the scene of the first Alaska gold discovery and subsequent gold rush of the 1880s and 90s, mining operations had become part of the characteristic landscape in some portions of the drainage. Discussing the portions of the proposal crossed by the Taylor Highway, from the West Fork at milepost 49 to the Fortymile at milepost 112, the EIS stated, "A distinctive feature of the river area in that segment is the presence of past and present gold mining activities." (DOI 1973a). The ready visibility of past and present mining operations, the highway, and other human alterations to the natural landscape were the principal reasons that certain river segments were recommended for designation as scenic or recreational, and other, more natural-appearing segments were recommended as wild rivers. The number of mining operations has historically fluctuated with the price of gold and other economic factors. As indicated in Section 3.2.1, placer mining had declined significantly in the late 1960s, and was at a low ebb during the wild and scenic river recommendation process. Mining activity within the drainage increased between the 1974 recommendation, and Congressional designation of the Wild and Scenic river in 1980 (DOI 1980).

Existing Management Direction

In describing how activities on mining claims should be regulated, Congress in Section 9 of the Wild and Scenic Rivers Act said that "regulations issued...shall, among other things, provide safeguards against pollution of the river involved and unnecessary impairment of the scenery within the component in question." Section 10 provides further management guidance:

> "Primary emphasis shall be given to protecting its esthetic, scenic, historic, archaeologic, and scientific features. Management plans for any such component may establish varying degrees of intensity for its protection and development, based on the special attributes of the area."

Section 10 thus implies that visual resource management objectives for river segments can vary, depending on the classification of a particular segment, the existing degree of naturalness in the landscape, and the importance of naturalness in maintaining the opportunities offered to the public in that location.

BLM has not formally designated visual resource management (VRM) classes for the Fortymile National Wild, Scenic, and Recreational River. However, nationwide BLM policy directs that the wild segments would be managed as VRM Class I. A specific policy statement has not been developed for scenic or recreational rivers, but in general, BLM attempts to adhere to VRM Class II visual quality objectives. This is the standard by which long- term camping is managed on federal holdings within the scenic river segments. A description of VRM classes and their attendant visual quality objectives is presented in Appendix C-3. For long-term camping associated with suction dredging, and other mining activities on federal lands that require an EA, BLM conducts a visual contrast rating of the proposal and uses this information to modify project design and location, or to develop site-specific mitigating measures to minimize visual impacts. However, effective management of visual resources in the area covered by this EIS is complicated by the intermingled land ownership patterns. On the navigable stream segments, which constitute about one-quarter of the entire Fortymile National Wild, Scenic, and Recreational River, BLM manages both banks, but not the riverbed itself, which belongs to the State. State-owned lands within the Fortymile River drainage are specifically excluded from the Wild and Scenic corridor (16 USC 1283(b)). The entire river corridor is a one- to three-mile wide ribbon of BLM- administered federal land largely surrounded by State and Native selections. The viewshed of the National Wild and Scenic River thus encompasses portions of all these jurisdictions.

The State of Alaska recognizes areas having special management designations and "[T]he public trust doctrine does require [the State of Alaska] DNR to regulate mining activities on navigable riverbeds to insure that mining activities do not substantially impair public use of the river and the riverbed for navigation, recreation [paramount rights] and other protected purposes." (Atty. Gen. Op. #3, File A66-061-82). Alaska Statute 38.05.185 suggests the State recognizes there may be significant uses of uplands adjoining navigable rivers where mining is allowed on the riverbed. The statute provides the opportunity for the Commissioner to adjust the mining use of the riverbed in support of a [significant surface] use. (Atty. Gen. Op. #3, File A66- 061-82).

The Wild and Scenic Rivers Act stresses the Importance of cooperating with the State or entering into a written cooperative agreement, and encourages cooperative planning and administration of the national wild, scenic, and recreational river system.

General Effect of Mining on Visual Resources

Mining has previously affected the landscape In two different ways. First, mine sites themselves and associated improvements such as access routes have altered the natural landscape to various degrees, as indicated herein. Second, mining has periodically generated turbid water that can persist for miles downstream and affect vlsual resources over a much greater area than the mining operation and its associated improvements. Although noticeably turbid water is a temporary visual Impact, its effects can be signlflcant because of the potentially large area affected.

Characteristic Landscape as Viewed from Most Frequently Used Travel Routes

From the Highway - Viewers traveling the Taylor Highway pass active and inactive mining sites where substantial mining has altered the natural topographic and vegetative mosaic, and left tailing and overburden piles of various slzes. Most of the early piles have a sparse cover of willows and grasses on them. The more recent piles are mostly barren of vegetation and are generally larger and more conspicuous than the earlier ones. The tailing and overburden piles obscure views in some areas and in some cases provide a stark contrast to the slopes beyond. The smaller tailing and overburden piles with willow growth may go unnoticed by viewers not familiar with Alaska scenery. In contrast, the unaltered side hills along the route are essentially pristine.

Mining camps are located adjacent to the highway and are visible from it. A camp may consist of log or frame structures, and trailers. There may be numerous pieces of earth-moving equipment, pumps, sluice boxes, and miscellaneous mining equipment at the camp.

From the River - To people floating the wild and scenic river system, most of the river bank appears undeveloped except for bridges and where the road is close to the stream channel. More remote areas appear primitive, with views unobstructed by any facilities. In many places, the view from the water surface is confined by the entrenched character of the river and the stands of trees along the banks which preclude, except for brief periods, scenic vistas other than the river channel. The visual screening provided to river users was noted on page 64 of the EIS for the wild and scenic river proposal: "Gold mining in the Fortymile River has substantially altered the environment, yet when viewed from the river the area is pleasing to the eye" (DOI 1973a).

The following is a brief description of the sights and sounds likely to be encountered by boaters on floatable segments of the National Wild and Scenlc River.

North Fork and the Middle Fork Rivers - The North Fork and the Middle Fork Wild River segments offer the best opportunity to experience solitude and a primitive setting, but are not noted for whitewater excitement.

The first takeout point Is at the Fortymile bridge 90 miles downstream. No mining development of the uplands on North Fork and the Middle Fork River segments are recognizable by the casual observer. Historically the area has seen mining activity but few identifiable marks of the Industry remain. No active federal claims are located on these segments.

South Fork Bridge to Fortymile Bridge - This popular 38.1 mile segment is designated scenic. Commencing approximately 2.5 miles downstream of the bridge, the natural setting of this segment appears primitive from the river. There are no active federal mining claims visible or audible from the river on this stretch. A short segment of the Taylor Highway can be seen and traffic Is audible from the left bank of the South Fork and the Walker Fork confluence, but is probably seldom noticed by floatboaters.

Evidence of historic upland mining activities can be observed from the river, but Is easily missed by the casual observer. The feeling of solitude is punctuated by current year suction dredging operations and ancillary activities, such as motorized boating, equipment and material on the shoreline, camping on the upland, and suction dredge tailings.

From 1985 through 1987, between seven and nine camps have occupied the uplands along the South Fork, and between 9 and 13 suction dredges were known to be operating on the segment during the period. All camps are adequately screened but may be visible from the river for two to five minutes while floatboating. In most cases the meanders along the river provide an adequate visual barrier, and the water sounds from the riffles help reduce the noise caused by motorized equipment. These topographic screening effects apply to all segments where human activities are conducted. Suction dredging activity extends from the bridge downstream to Uhler Creek at South Fork River mile 15.9; little activity is conducted on the South Fork downstream of this point.

The Fortymile River below the confluence of the North and South Forks is designated scenic but still conveys the same feeling as the wild areas upstream on the North Fork. A floatboater can expect to pass between one and four suction dredge operations in this 16.2 mile stretch, where one State riverbed claimant maintains control of the claims and assists BLM and the State in orderly use of the shore and uplands.

Fortymile Bridge to Canadian Border - The Lower Fortymile, designated as scenic, commences at the Fortymile Bridge and flows east 23 miles to the Alaska/Canada border and the Yukon River. This segment has received the highest mining use of any navigable river in the drainage. Recent upland mining activities are visible at numerous locations. A casual observer would be constantly reminded of upland mining development and activities while boating this segment. Currently, over 20% of a casual observer's float time is affected by existing mining activity including vegetation and surface disturbances. Additionally, there are extensive mining activities in Canada downstream of the border.

The setting is punctuated by evidence of the current year suction dredging operations and ancillary activities. From 1978 to 1987, between two and seven camps have occupied the uplands along this stretch. A minimum of two camps, and between two and four suction dredges can be

seen operating on the segment. The camps are screened, yet are visible for two to ten minutes when floatboating.

West Fork of the Dennison to South Fork Bridge - The West Fork of the Dennison, designated scenic, is a pleasant 25.8 mile weekend trip from Tok, yet receives little floatboat or other use. The trip commences at the 49-mile bridge on the Taylor Highway and the takeout point is at the South Fork bridge at mile 75. This segment requires an early season float between breakup and the first of July, after which the water level is unpredictable. The Dennison Fork segment has primitive scenery consisting of meanders and talus slope cuts; a 1966 fire burned much of the area, and opened up some scenic vistas. No State or federal mining claims are located along this non-navigable section.

The last 5.3 miles of this trip are on the South Fork, which flows close to the Taylor Highway and two federal mining claims that can be seen or heard, during brief intervals, from the river. This segment of the South Fork above the bridge is easily accessible and receives the highest suction dredging use of any segment, due to its popularity with short-term, recreational suction dredge miners.

Visitor Attitude Toward Changes in the Landscape

Before 1983, BLM received regular complaints from suction dredgers about poor water quality on the South Fork, which was attributed to Lost Chicken Creek and Wade Creek operations. Since 1983, such complaints have essentially stopped, indicating substantial improvement in perceived water clarity, which is also of prime interest to recreational users of the river system. The community of Chicken is close to this area so there is a sizable visitor population during the summer months. Past and present mining activities have dominated this section of the mainstem. Suction dredging and placer mining between miles five and seven of the Taylor Highway have a significant visual effect. Many, if not most, of the highway sightseers are interested in the mining history of the area, and find the mining along the highway and river systems to be interesting. Those visitors driving through from Canada are more likely to have been exposed to interpretive information on mining (in Dawson and Whitehorse) and are probably less likely to be disturbed by mining activities.

In contrast, visitors pursuing non-motorized recreation activities typically prefer a natural landscape. Historic abandoned mining sites, where the stark visual contrast has been softened by the passage of time, are frequently perceived as interesting features, while active mines may be perceived as an unwanted visual intrusion.

3.11 Socio-Economics

Placer Mining In Alaska's Economy

The following discussion Is taken from a report by the Alaska Department of Commerce and Economic Development - Office of Mineral Development entitled "The Role of Placer Mining In the Alaska Economy 1985" (ADCED 1986).

"Expenditures by Alaska placer miners for labor, goods, and services were approximately $75 million in 1985. Of these expenditures, $63.4 million were made in Alaska. About 36% of the total expenditures were made In Fairbanks, and 31% of the workers reside there. Anchorage also plays an Important role In the placer mining industry, accounting for 23% of the expenditures and 16% of the work force. Placer mining is a major contributor to the economy of rural Alaska as 34% of the work force comes from rural Alaska and 18% of the total expenditures are made in small communities around the state. Washington and other states play a smaller role in the industry, accounting for 15% of the expenditures and 19% of the labor force.

"Direct employment in the Industry is approximately 10,000 person-months and an estimated 2,226 people are involved in the industry on at least a part-time basis. If direct employment is added to this figure, the total employment by the 410 active placer mining operations Is estimated to be 20,136 person-months or 1,678 person-years.

"The placer mining industry has a significant indirect impact on Alaska's economy. The $63.4 million of statewide expenditures had a total impact on sales in the Alaska economy of $127.4 million. The Income multiplier results in total wages and salaries resulting from placer mining of $33 million and an estimated 841 people are employed by support industries serving placer mining. These figures demonstrate the importance of placer mining in the Alaska economy.

"Analysis of the input-output models allows estimation of the output, income, and employment multipliers showing the total impact on the economy resulting from placer mining. These multipliers are:

	Output	Income	Employment (per $ million)
Alaska	2.01	2.54	26.5
Fairbanks	1.71	2.14	23.1
Anchorage	1.88	2.49	25.9

"The output multiplier shows the total dollar sales In the economy due to each dollar placer miners spend in Alaska. It allows calculation of the total sales in the economy due to placer mining. These sales are the sum of the placer miners' expenditures and the expenditures made by their suppliers to meet the miners' needs. It includes all rounds of spending.

"The income multiplier shows the total wages and salaries paid in the economy for each dollar placer miners spend on payroll. It allows calculation of the total salaries and wages paid in the economy due to placer mining, including the initial payroll expenditures by the miners and the payroll of mining support firms that is attributable to placer mining.

"Similarly, the employment multiplier shows the total employment in the economy for each million dollars in the in-state expenditures made by placer miners. It allows calculation of the total employment in the economy due to placer mining. It includes both the direct employment at placer mines and the employment due to sales to placer miners.

"The multipliers are different for each region due to both varying degrees of self-sufficiency and different types of expenditures by placer miners. Since the Fairbanks economy is less developed than that of Anchorage, there is more "leakage" from the region and so the multipliers are lower.

"Based on these multipliers, the total impact on sales in Fairbanks is about $46 million, in Anchorage about $32 million, and in the state as a whole, $127 million. The total impact on salaries and wages in Fairbanks is $9.5 million, in Anchorage $5.5 million, and about $33 million in Alaska. The total impact on employment in Fairbanks is about 625 full-time employees, in Anchorage about 438, and in Alaska 1,678."

Current Status of Placer Mining

The number of placer mining operations in Alaska declined from 1985 to 1986 and from 1986 to 1987, while both the price of gold and gold mining activity in the rest of the world have gone up. From 1985 to 1986, Alaska gold production decreased 16%, the number of placer mines decreased 27%, 385 Alaska placer mining jobs out of about 2,000 statewide were lost, and the eastern Interior region saw a 49% drop in mining employment.

A major reason for the decline in Alaskan placer mining is the complexity and uncertainty of present and future regulatory requirements, the financial liability associated with these requirements, and the cost of complying with standards. The number of potential permits and approvals required translate into time and expense for the miner. The monetary risks associated with enforcement of current criteria are high, i.e. violators may be subject to fines of $25,000 per day. Only those mines having no discharge and those discharging into a large receiving stream can consistently meet the turbidity criteria. Miners carefully consider whether they should borrow capital or buy equipment that will take years to repay if there is a chance they will be shut down in the near future.

The current injunctions affecting public lands could cause an economic hardship on miners using five or more acres. The loss of the 1988 mining season may force some miners out of business if they lose equipment and experienced work crews, and are unable to repay loans.

In addition, a miner's decision to operate in the future would be based on the economic principle that a facility's revenues must cover the operating costs. Mine closures would be likely if an

operation cannot produce sufficient revenues to cover operating costs. The decision to operate cannot be made in isolation, and, therefore, a projection of economic loss is not sufficient for closure decisions. Included in the decision to operate are considerations of price expectations, individual operating costs, uncertainty of regulatory controls, closure and restart costs, financial status, and tax loss advantages.

Fortymile River Basin Characteristics

It is estimated that less than 150 people reside year round in the Alaska portion of the Fortymile River basin. Summer population is somewhat higher, possibly reaching 800 (DOI 1983). With a population of 48 people in 1985, Chicken is the largest community in the drainage. Just to the north of the drainage are Eagle and Eagle Village which together had a population of about 270 people in 1985. Suction dredgers are concentrated along the road system, and it is estimated that during 1982 the number of people reached 400. The suction dredgers typically reside in temporary camps on the shore near their operation (DOI 1983).

Employment in placer mining in the Fortymile River drainage has fluctuated substantially over the last 100 years. Varying levels of placer mining employment are given in different sources. Buntdzen estimates placer mining employment in 1985 at 54 persons. Data from surveys conducted by ADCED (1986) estimated employment to be 679 person months. Using the statewide average, this translates into about 155 employees. Suction dredgers may increase this total number of employees dramatically (DOI 1983).

Early interior Alaska mining family. Photo courtesy of Anchorage Museum of History and Art.

According to Peterson et al (ADCED 1986) almost half (48%) of the person months worked are by employees who live in rural Alaska. This may be due to the area's distance from Fairbanks and Anchorage. Only 14% and 17% of the labor was provided by residents of Fairbanks and Anchorage respectively. Twenty percent of the labor was provided by people residing outside Alaska. Total labor costs in wages amounted to an estimated $544,000 in 1985.

Total expenditures by miners in the drainage are estimated to have been more than $2,120,000 in 1985. The data show a far greater proportion spent in Anchorage (18%) and rural Alaska (31%) than is true for the Birch Creek, Beaver Creek, and Minto Flats drainages. The proportion spent in Fairbanks (41%) is correspondingly lower. The proportion spent outside Alaska (8%) is roughly the same as that in the other drainages and is much less than the 15.5% average for placer miners in the State as a whole.

Fortymile River

Chapter IV
Environmental Consequences

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This chapter discusses the potential consequences or impacts of each of the alternatives described in Chapter Two. The intent of this chapter is to provide the scientific and analytical basis of the comparison of the alternatives (Figure 2-6).

Cumulative Impacts

The evaluation of cumulative impacts requires the integration of time, space, mining/non-mining, and federal/non-federal actions in a complex and dynamic environment. The spatial aspect is covered by considering the impacts of multiple mining operations in the Fortymile River drainage (Placer Mining Operations and Access Roads Map, Chapter Three). Time is considered by evaluating the past, present, and reasonably foreseeable future actions of placer mining. Past and present impacts are part of the existing environment, discussed in detail in Chapter Three, Affected Environment. The projected number of mines, acreages of disturbance, and miles of roads and trails were calculated using methods outlined in Appendix B-1, and are summarized in Figures 2-2, 2-3, and 2-4. Future impacts are discussed in this chapter, Environmental Consequences. Impacts from non-federal mines are included in the discussions of current environment and projected impacts. In particular, the impacts of Alternative D, no mining on federal claims, shows the effects from mining on State and private mines. Non-mining actions are discussed in Chapters Three and Four as appropriate.

For a summary of the impacts and comparison between alternatives, reference Figure 2-6, which depicts past, 1987, and projected 1998 impacts for the Proposed Action and each alternative. Cumulative impacts are discussed under the "Special Considerations" section for each resource in Chapter Four.

Projection of Mines

Forty mines (23 federal and 17 State and private mines) were projected to be operating in the Fortymile River drainage (primarily in the Mosquito-South Fork, Wade, and Canyon Creek drainages) over the next ten years under the Proposed Action. This level of mining activity was projected so that the cumulative environmental effects of increased mining activity within the drainage could be assessed.

Projections on the number of mines that would operate under Alternatives A, B, and C were based on the compliance costs to meet water quality requirements of these alternatives as compared to the Proposed Action's compliance costs. These costs are listed in Figure 4-7, and a comparison clearly indicates that the estimated water treatment costs for Alternatives A, B, and C are significantly higher than those estimated for the Proposed Action. Due to these significant increases in compliance costs, BLM estimated that there would be a reduction in the number of mines operating under these alternatives. Under Alternatives A and B, 35 mines (20 federal and 15 State and private mines) were estimated to be operating in 1998. Similarly, 30 mines (18 federal and 12 State and private mines) would operate under Alternative C due to additional increases in water treatment and reclamation costs. These reductions are discussed further in the following paragraph. Under Alternative D, no federal mines would be operating, while 17 State

and private mines would be operating under the standards of the State as outlined in Appendix B-4.

The water treatment costs cited in Figure 4-7 were taken from an EPA report (EPA 1987b) that analyzed the economic impact of effluent standards on the placer mining industry. In the EPA report, six water treatment technology options were outlined and their associated costs for Alaska were estimated. BLM reviewed these options and selected the three treatment technologies that came closest to meeting the various water quality standards of the Proposed Action and Alternatives A, B, and C. The Proposed Action treatment technology would be a simple settling system that consists of primary and secondary settling ponds operated with an EPA variance for turbidity discharge, similar to treatment technology option two. Alternatives A and B, with water quality standards of .2 ml/l settleable solids and the 5 NTU turbidity standard, and no EPA variances, would require operating with no seepage of effluent to the stream, or the option four water treatment technology listed by EPA. EPA estimated that operating this water treatment system would reduce the operator's income by approximately 13%, so BLM reduced the number of mines that would operate by that same percentage. Alternative C, with water quality standards of zero ml/l settleable solids and zero NTU turbidity increase, would require operations comparable to the option 6c water treatment technology, including zero discharge, 100% recycle of process water, and flocculants. For this system, EPA estimated that the operator's income would be reduced by about 27%, so the number of mines was reduced by that percentage. The costs in Figure 4-7 are representative of a mine that processes 50,000 cubic yards per mining season.

A worst-case scenario to describe a level of placer mining more intense than expected, was analyzed to predict those possible cumulative environmental impacts. This scenario could occur if unforeseeable circumstances caused this high level of activity, such as the price of gold increasing by several hundred percent. The summary of this analysis is presented in Figure B-1 and the assumptions are listed in Appendix B-2.

Under any of the alternatives, special considerations are:

- Cumulative Impacts
- Unavoidable Adverse Impacts
- Short and Long-Term Impacts on Productivity of Resources
- Irreversible and Irretrievable Commitments of Resources

4.1 Geology and Topography

The scale of disturbance of natural topographic features by placer mining and related activities is quite small. Further, such disturbances would be confined principally to redistribution of unconsolidated/semi-consolidated surficial geologic materials, which should generally be amenable to subsequent reclamation. Appreciable portions of streams and riparian areas are subject to short-term disturbance, frequently rather intensive in character, but long-term impacts are subject to prevention-amelioration via responsible, substantive reclamation efforts.

The Proposed Action and Alternatives A, B, and C require reclamation which would result in little net modification of the overall topography of areas which have undergone mining activities. There would be some short-term impacts, quite local and small scale, of landscape modification during mining activities. Modifications on federal claims should be subsequently reclaimed, and yield few or no significant long-term impacts. A principal objective of effective reclamation is to return the landscape to a condition similar to that which existed prior to mining activity. Thus, with increasingly more stringent reclamation standards from Alternatives A and D, to Alternative B, to Alternative C and the Proposed Action, effects on topography which involve stream channel and riparian disturbances would be increasingly minimized. There should be little likelihood of irreversible or irretrievable commitments of topographic resources, in the sense of appreciable or significant net landscape modification under any of these alternatives. The required reclamation of new mining under any of the alternatives, could result in reclamation of adjacent older disturbed areas as well.

4.1.1 Proposed Action

Approximately 920 acres of river benches and bottomlands would be disturbed and 560 acres would be reclaimed within 10 years, with the remainder reclaimed at the end of mine life. Therefore, no significant cumulative impacts on topography, given the required reclamation, are expected.

An estimated total of 70 riverbed acres would be mined within the next 10 years based on the estimated amount of suction dredging that occurred in the Fortymile drainage in 1987. This is approximately 2.5% of the estimated navigable riverbed area (2,806 acres) and does not consider the possibility of certain areas being mined more than once, which would reduce the total area mined. Reclamation of the mined areas would be primarily through high water events.

Direct effects may be significant during actual mining due to disturbance and redistribution of gravel, overburden, and related materials. Principal indirect effects would be the possibility of increased erosion of these materials during and after such disturbance, although required reclamation would minimize this possibility.

Little riparian bank or soil damage is projected as a result of undercutting banks, channelizing the riverbed, or other activities conducted by suction dredging. No effects are projected as a result of long-term camping.

4.1.2 Alternative A

There could be discernible modifications of landscape aspect under this alternative, since the reclamation requirements are directed only to stabilization of disturbed areas; reshaping is not required. However, the scale of these alterations would be relatively small in the overall context of the topographic features in this area of appreciable natural relief. Past disturbances cover approximately 1,050 acres; and projected disturbance over ten years would be 805 acres.

4.1.3 Alternative B

Impacts would be the same as the Proposed Action, except 805 acres would be disturbed.

4.1.4 Alternative C

Impacts would be the same as the Proposed Action, except that 690 acres would be disturbed and reclamation would be required on all federal, State, and private operations.

4.1.5 Alternative D

The cumulative impacts would be similar to the Proposed Action, except that no further federal mining-related disturbance would occur. Mines on State and private lands (391 acres) within the study area would not be affected by this management alternative, hence the impacts would be similar to, but less than the situation under the Proposed Action.

4.1.6 Special Considerations

Cumulative Impacts

Total cumulative impacts to geology and topography would consist of past and current impacts in addition to those impacts discussed under each alternative. Historic mining activity has disturbed over 1,000 acres of river benches and bottomlands, and 240 acres of tailings were mined in 1987. Sixty acres of this latter area were reclaimed in 1987 by reshaping and stabilization. Under the Proposed Action, the total cumulative impact would be 1,350 acres unreclaimed in 1998; Alternatives A and B would result in 1,300 acres of unreclaimed area; Alternative C would result in 1,260 acres of unreclaimed land, and Alternative D would have unreclaimed lands from the historic and additional non-federal surface disturbance of 1,142 acres.

Unavoidable Adverse Impacts

For all alternatives except A, there would be minimal alteration of original site aspect on federal claims, as reclamation requires restoring the site's original configuration. During mining, the site aspect would be modified to some degree, dependent upon the particular situation; this might be obtrusive in some situations.

For Alternative A, reshaping, except as necessary to stabilize against erosion, would not be required as part of reclamation. Thus, some readily discernible impacts to landscape aspect might result. These would be small-scale, however, in terms of the overall topography in this region of appreciable relief.

Short-Term Uses vs Long-Term Productivity

For all alternatives except A and D, there would be some short-term modification of site aspect during mining, which would not, however, significantly impact the overall topographic setting of the public lands within the affected area, since the required reclamation would include reshaping and stabilization.

For Alternative A, the situation would be generally similar to the Proposed Action. However, reclamation on federal claims would not require reshaping except where necessary to stabilize against erosion; thus some of the more obtrusive short-term disturbances of landscape aspect may persist over the long term.

For Alternative D, the situation would be generally similar to the Proposed Action. However, cessation of all mining on federal claims would end further short-term and long-term alterations of topography on these claims.

Irreversible and Irretrievable Commitments of Resources

For all alternatives except A and D, there would be no significant irreversible and irretrievable commitments, since the required reclamation on public lands would be directed to reshaping and stabilizing the disturbed areas.

For Alternative A, the situation would be generally similar to the Proposed Action. The possible persistence of some landscape modifications might be construed as representing a commitment, in terms of changed site aspect. However, this should be on a relatively small scale, and be relatively unobtrusive when viewed in the context of the overall topographic relationships within this region of appreciable relief.

For Alternative D, the situation would be generally similar to the discussion for the Proposed Action. Cessation of all mining on federal claims would end any further resource commitments relative to these claims.

4.2 Mineral Resources

Alternatives A, to B, to the Proposed Action, to C, become successively more restrictive to mineral resource development, while D precludes mining on federal claims. Thus, the short-term impacts are likely to be successively increased costs and inhibited further development of known mineral deposits, resulting from the increasingly severe restrictions under Alternatives A through C. For the short-term, most operations likely would try to cope with these restrictions. Success would vary, depending on a complex of physical and economic factors, unique to each location, deposit, and operator. Over the long term, there would inevitably be a reduced number of operations, the size and scale of which would need modification. Additionally, increasing severity of restrictions, from Alternatives A to C, would probably result in some reduced incentive for further

exploration and development of new deposits, or extensions of known deposits. Alternative D would extinguish such incentives on federal mining claims.

"Commitment" of mineral resources can be somewhat simplistically construed in one of two ways. One view is that resources not developed, remaining in the earth, represent a "savings account" for possible future use. There is no irretrievable-irreversible commitment of mineral resources from this perspective; they merely remain unused and undiscovered, subject to future events. This view is frequently advocated with the avowed intent of preserving valuable resources for future, presumably more pressing, societal needs, including dire emergencies. However, there is inevitably appreciable time and effort required in order to obtain a product useful to society from even the known deposits (let alone undiscovered resources) of mineral raw materials in the earth. Thus, this interpretation of preservation for future urgent needs is not totally consistent with physical reality. Further, inhibition of mineral resource development in an area inexorably carries with it the corollary inhibition of exploration for extensions of known deposits and/or new deposits. This, in another sense, represents "irreversible and irretrievable commitment" of undiscovered resources, via ignorance of their existence, to a limbo of non-use by humanity.

Alternatively, development of mineral resources obviously entails physical removal from the earth, and "commitment" to other uses, presumably of both physical and economic benefit to human society. The minerals themselves are thus consigned, irreversibly and irretrievably, to human use, including repeated recycling in many instances.

Thus, as restrictions on the development of mineral resources increase, from Alternative A to the Proposed Action through D, the likelihood of "commitment" of the resources, in the first sense as used above increases. Conversely, the likelihood of "commitment" in the second sense as used above decreases. Commitment of mineral resources is most commonly thought of in the second sense, i.e., development; hence, the Proposed Action would be most likely accompanied by maximum commitment, Alternatives A and B, and Alternative C would entail successively less, and no commitment would occur (for public lands) under Alternative D.

4.2.1 Proposed Action

There would be no significant impacts on the development potential of mineral resources.

4.2.2 Alternative A

Impacts would be slightly greater than the Proposed Action, but still not significant.

4.2.3 Alternative B

Impacts would be slightly greater than the Proposed Action, but still not significant.

4.2.4 Alternative C

Impacts would be slightly greater than the Proposed Action, but still not significant.

4.2.5 Alternative D

Mining activity, resource development, and use would end on federal claims. There would be severe negative impacts on exploration, extension, and development of known and unknown resources on public lands in the area and region.

There would be the direct effect of cessation of mining activities on federal claims, as well as related exploration and development, plus the indirect negative effect on exploration and development in the region, and elsewhere in Alaska as well. Known and undiscovered resources which otherwise might have been of value to society will be unused.

4.2.6 Special Considerations

Cumulative Impacts

Total cumulative impacts upon mineral resources in terms of development of those resources actually known to exist as well as those presently undefined consist of past and current impacts, in addition to the impacts discussed under each alternative. There are severe limitations to quantitative evaluation of these impacts, due to data shortcomings concerning past production, and serious uncertainties regarding meaningful estimates of remaining resources.

Qualitatively, the historical past has seen few restrictions on development of mineral resources within the watershed, other than those attendant to economics, remoteness, climate, and related factors. Performance standards of the alternatives and regulations of other agencies add some restrictions to the unregulated development of mineral resources. Alternatives A and B would essentially continue the historical situation, while the Proposed Action would be somewhat restrictive, and Alternative C would be more restrictive to mineral resource development. Alternative D would preclude further mineral resource extraction on federal lands.

Unavoidable Adverse Impacts

There would be no significant impacts under the Proposed Action or Alternatives A, B, and C, while Alternative D calls for a total cessation of mining and related activities on federal claims.

Short-Term Uses vs Long-Term Productivity

For all alternatives except D, short-term production of non-renewable resources necessarily implies decreased productivity at some future time. However, without development and use, mineral resources are "resources" only in a somewhat hypothetical sense. In the case of Alternative D, both short-term uses and long-term productivity would effectively be precluded on federal claims.

Irreversible and Irretrievable Commitment of Resources

Mineral resources developed and produced represent irreversible and irretrievable commitments to human use. The resources may be recyclable, but are ultimately non-renewable, in terms of human use. This would be the case for all alternatives except D.

4.3 Soils

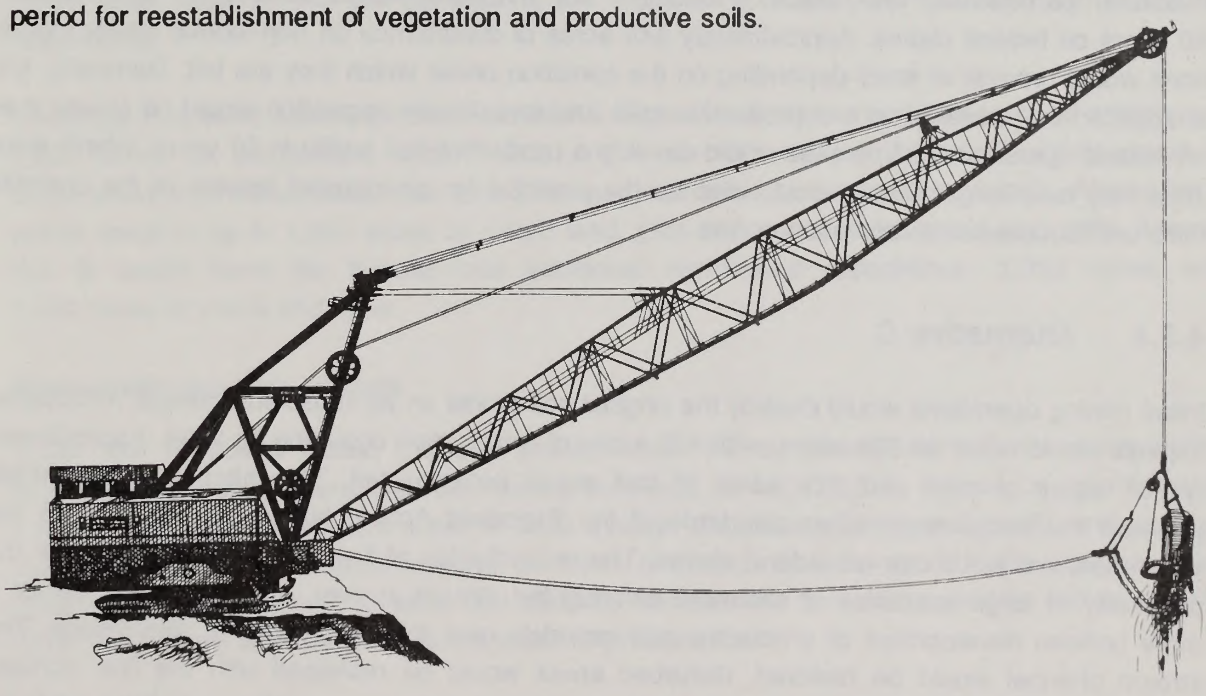
The initial direct impact to soils from placer mining is the same under all alternatives, i.e., the soil profile would be altered on areas disturbed by mining. The differences lie in the extent of ground disturbed and the measures taken to promote recovery. Generally, placer mining completely destroys the structure of the existing soil profile through the stripping of overburden and processing of pay gravels. The usual procedure is for the overburden (including organic materials) to be stripped, coarse underlying materials separated from gold-bearing material in the processing plant, and fine materials treated or discharged with the wastewater stream. Pergelic and poorly drained clay soils are stripped and mixed with sand and gravels in most modern placer mines. Barren rock is rarely a product of today's placer mines. To segregate and isolate washed coarse rock is very unusual; it is the current practice to place both fines and oversize materials into one final place to be reclaimed. The soil base is altered to a sandy, organic-deficient loam that will support revegetation, if proper reclamation is achieved. Three categories of wastes are produced as distinct units: overburden moved to the perimeter of the area of operation, larger rock and soil material deposited as tailings, and fine material collected in settling ponds or discharged with the wastewater stream. Under natural processes recovery from such disturbance occurs gradually over what may be a considerable period. Sidecast overburden begins to recover immediately. Revegetation of undisturbed fine sediments in settling ponds may begin as soon as the ponds are drained. However, old tailing piles, especially these remaining from dredge operations, differ because they lack fine materials to trap moisture, so revegetation of these features is a very slow process. Initial growth occurs near waterline or where fine materials remain at or near the surface as a result of incomplete processing. Vegetative cover develops gradually in depressions or on the tops of the piles where wind or water-borne fine materials or organics accumulate, or where weathering is sufficient to degrade the coarser materials. Soil development and revegetation of more resistant or exposed areas of the tailings may require decades. The vegetation which occurs in such disturbed areas is typical of that which occurs in well-drained, warmer soils.

All alternatives discussed will result in long-term unavoidable impacts to the soil resources in the areas disturbed by mining. The rate of recovery will differ depending on conditions at any given site. The total expected disturbance under any of the alternatives is less than 0.05% of the drainage area. It is not known what percentage of a particular soil type within the basin will be affected.

4.3.1 Proposed Action

Approximately 920 acres would be disturbed by 1998, the soil profile would be completely altered on all these disturbed areas with approximately half of the disturbance (529 acres) attributable to federal mining operations. Reclamation would occur on 560 acres. All federal operators would be required to reestablish the stream channel in the original floodplain to a condition that approximates its premining length, flow velocity, hydraulic gradient, and cross- sectional configuration; shape the tailings and distribute overburden; and, if deemed necessary by BLM, enhance the regrowth of vegetative cover by distributing the settling pond fines, fertilizing, and/or seeding. Operators on State or private claims would be subject to the less stringent reclamation standards specified in Appendix B-4. As a result, mined areas should show reduced rates of erosion but would not generally show the initiation of productive soil materials for approximately 25 to 50 years on federal claims and 50 years or longer on State and private claims. Locations devoid of fine material, especially areas mined in old tailings, would develop extremely slowly if at all with little or no vegetation being established in the near future. Areas rich in fine material would develop a productive vegetative cover more rapidly, but would be subject to high rates of erosion until a successional plant community is established. Areas not stabilized would continue to erode. Disturbance of the soil profile and/or compaction of soils on an additional 1,100 acres of road and 235 acres of trail is anticipated. These routes would generally remain in permanent use and would not be reclaimed.

There is no possible way to mitigate the disturbance of the soil profile if placer mining takes place under current practices. Measures to reduce the length of time soils are unstable and subject to non-point erosion are the differing reclamation standards addressed in the alternatives. Under the Proposed Action, the intensive reclamation efforts for federal claims would shorten the recovery period for reestablishment of vegetation and productive soils.



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4.3.2 Alternative A

The physical impacts to soils under this alternative are similar to the Proposed Action. A reduction from 926 acres to 865 acres of disturbance and from 560 to 490 acres of reclamation would not make a significant difference to the soils resource on a watershed-wide basis. Roads would occupy 914 acres, and trails, 205 acres. The reclamation practices used on the federal claims would aid in stabilization of remaining soils. Stockpiling and respreading overburden would not be required under this alternative. Respreading the fines, fertilizing, or reseeding would not occur on a site-specific basis, as it would under the Proposed Action. Recovery of soils and vegetation would occur more slowly on areas where such reclamation did not occur, thus, a higher proportion of disturbed area would remain barren or sparsely vegetated and subject to higher non-point source erosion. State reclamation requirements remain the same as for the Proposed Action, as does the recovery time of 50 years or more.

4.3.3 Alternative B

The initial physical impacts to soils would be the same as in Alternative A, with 805 acres of disturbance and 490 acres of reclamation, 914 acres of road and 205 acres of trail. The different reclamation practices would determine the eventual impact on soil materials. All federal operators would be required to stabilize the stream channel, reshape tailings, and respread the overburden. Operators on State and private claims would be subject to the reclamation requirements specified in Appendix B-4. This would result in lower rates of erosion than Alternative A by providing some protection to the soil material. Respreading of the overburden on federal claims would promote the development of vegetative cover by providing micro-relief and fine-grained materials to trap moisture, particulates, and seeds. Productive soil materials would develop in approximately 50 years on federal claims. Approximately 345 acres of disturbance on non-federal mining operations would recover at rates depending on the condition under which they are left. Generally, it is anticipated that development of productive soils and invasion by vegetation would be slower than on federal operations. Some sites would develop a productive soil profile in 50 years, where other sites may take longer. There would also be the potential for accelerated erosion of the unstable fines until successful revegetation occurs.

4.3.4 Alternative C

Initial mining operations would destroy the original soil profile on all impacted acreage. Anticipated impacts would occur on 691 acres, with 420 acres of reclamation occurring by 1998. Approximately 767 acres of road and 171 acres of trail would be impacted. This alternative essentially provides the same reclamation standards of the Proposed Action, but for all operators in the watershed, not just those on federal claims. The redistribution of fine material should reduce the possibility of large quantities of sediment entering the stream system, and would provide for a more uniform development of productive soil materials over the entire area of disturbance. The stream channel would be restored, disturbed areas would be reshaped with the fine material redistributed, and vegetation would be reestablished on the site. This would provide for a relatively

rapid development of productive soils in 25 to 30 years and reduce the potential for non-point source pollution (erosion and sedimentation) to minimal levels.

4.3.5 Alternative D

All areas disturbed after 1980 on federal mining operations would be stabilized and no new disturbance would occur on federal mining claims. Mining would continue on the State and private claims in the area, subject to the same State reclamation standards as under the Proposed Action and Alternatives A and B, resulting in approximately 391 acres of disturbance by 1998. Federal claim areas would generally not exhibit accelerated erosion and should provide for the development of productive soil materials in reclaimed areas where fine material is available. Soil development would be retarded in those areas where fine sediments are unavailable, as identified in the discussion on the Proposed Action.

4.3.6 Special Considerations

Cumulative Impacts

Total cumulative impacts to soils consist of past and current impacts in addition to those impacts discussed under each alternative. The soil profile is destroyed for long periods in areas of active dredging or sluicing, and shorter term impacts of soil compaction and alteration occur in areas of facilities, roads, and trails. Historic mining has disturbed over 1,050 acres of river benches and bottomlands; trails and roads currently cover over 730 acres of the watershed. Two hundred and thirty- eight acres were mined in 1987. Under each alternative, some of the projected mining would likely occur on old tailings, making the impacted acreage somewhat less than the totals listed below.

Under the Proposed Action, the total cumulative impact would be up to 2,208 acres of mining, and 1,335 acres of compaction under roads and trails. Alternatives A and B would result in 2,093 acres total mined area, with an additional 1,120 acres under roads and trails. Alternative C would result in up to 1,980 acres of mined land, plus 940 acres under roads and trails. Alternative D would have the historic and additional non-federal disturbance, 1,680 acres, with 1,120 acres of roads and trails.

Unavoidable Adverse Impacts

Under the Proposed Action the soil profile would be completely altered on approximately 920 acres by mining operations. Soil resources would be impacted by access on approximately 1,050 acres of roads and 235 acres of trails through disturbance of the soil profile and compaction. Soil loss would necessarily occur on areas of surface disturbance, but this would be minimized by the requirement to save and stabilize overburden. Sidecast materials and local relief would temporarily alter the surface response to precipitation.

Under Alternatives A and B the soil profile would be completely altered on approximately 805 acres by mining operations. Soil resources would be impacted by access on approximately 914 acres of roads and 205 acres of trails through disturbance of the soil profile or compaction. Increased soil loss would necessarily occur on areas of surface disturbance, but this would be minimized by the requirement to save and stabilize overburden. Sidecast materials and local relief would temporarily alter the surface response to precipitation.

The soil profile under Alternative C would be completely altered by mining operations on approximately 690 acres. Soil conditions may be impacted by access roads and trails through disturbance of the soil profile or by compaction. Increased soil loss would occur on all areas of surface disturbance until restabilization occurs. Sidecast materials and local relief would temporarily alter the surface response to precipitation.

Under Alternative D the soil profile would be completely altered on approximately 391 acres by mining operations on State or private claims. Soil conditions may be impacted by access roads and trails through disturbance of the soil profile or by compaction. Increased soil loss would occur on areas of surface disturbance.

Short-Term Uses vs Long-Term Productivity

Under the Proposed Action and Alternative C the disturbance of the soil profile for placer gold recovery would result in the temporary loss of vegetative production and lack of availability of the disturbed areas to potential users such as wildlife. The redevelopment of soils may result in increased species diversity over the long term. On federal claims under the Proposed Action and on all claims under Alternative C, productive soil materials would develop within 25-30 years on reclaimed areas.

Alternative B would require 50 years to develop a productive soil base.

Under Alternative A recovery of soils would be at least 50 years and in many cases longer, because overburden is not stockpiled and respread.

There would be no additional effect to soil productivity on federal claims as a result of mining operations under Alternative D. Short-term use on federal claims would be limited to reclamation activities. Activities on other claims in the area (approximately 50% of the current mining activity) would be unaffected and would proceed as in the Proposed Action, Alternative A, and Alternative B.

Under the Proposed Action and all the alternatives, restoration of the present undisturbed soil profile on mined sites may require centuries.

Irreversible and Irretrievable Commitments of Resources

The irretrievable commitment of soil resources on mining claims affected under the Proposed Action and Alternatives A, B, and C would include those soils moved off-site by erosion. Soil profiles would be completely disrupted in the areas affected.

Under Alternative D, there would be no further irreversible or irretrievable commitment of soil resources on federal claims.

4.4 Water Resources

The primary impact to water quality to be expected from mining operations in the Fortymile River basin is an increase in sedimentation and turbidity. Well conceived, documented long-term sediment measurement work, which considers the relative contribution of sediment from various sources under conditions which allow for an adequate comparison of mined and unmined waters, has not been conducted in Alaska. Moreover, the available data include substantial variations due to cyclic conditions such as rainfall, snowpack, vegetation, and other sediment-causing activities such as road-building and various mining techniques.

The EIS team used a sediment model based on EPA data to estimate a sediment rate for the Proposed Action. This model identifies several classes of activities that result in sediment generation (EPA 1973). Comparisons between these activities were used as a basis for the model (Appendix E-1). **The model is not site-specific for the Fortymile River drainage, and is only used for relative comparison of the alternatives.**

A similar sediment rate model was prepared for suction dredging occurring on the navigable river segments in the Fortymile drainage. The model recognizes various sizes of suction dredges contributing a wide range of sediment volumes. Model estimates use site-specific data based on the number of known suction dredges and locations of operations in 1987. Water resource data collection points used by Mack et al. (1987) were located downstream of both suction dredge and upland mine high-use areas. Appendix E-4 provides a comparison of suction dredging to upland mining and a sediment loading model.

Cumulative impacts to water resources in the Fortymile River drainage as a result of mining activities would continue to occur under all of the alternatives evaluated. This is in part due to the presence of mining operations in the basin which are not on federal claims, as well as current basin conditions. State mitigation and reclamation requirements are less restrictive than those that would be applied to federal claims under the Proposed Action. With the exception of impacts to surface waters, mitigation and reclamation on private claims is at the discretion of the owner. The Corps has jurisdiction over the discharge of dredge and fill materials to wetlands and navigable water bodies of the United States.

Due to the nature of the basin, its geology, and the relative size of the affected drainages, a large change in water chemistry in the Fortymile River basin is not expected, with proper sedimentation

controls. The absence of elevated primary contaminant concentrations in dissolved samples from the Fortymile drainage (Mack et al. 1987) suggests a relationship between contaminants and sediment load. This is echoed by the EPA in their response to comments on the 1988 placer mining NPDES permits, which states in part:

> "Treatment studies show that metals found in placer mining effluents are associated with soil particles and are removed at the same time other solids are removed from the wastewater."

LaPerriere et al. (1985) have suggested that, due to the presence of elevated dissolved lead concentrations in the absence of settleable solids at one sampling site in the Chatanika River drainage, sediment load reduction may not be sufficient to control heavy metal concentrations. More data would be needed to support this hypothesis and quantify the effects of sedimentation control on stream pollution. Most of the existing data suggest a positive impact, such as the Mack and Moorman study (1986) of 26 sampling sites in the Birch Creek drainage in 1984, which found that concentrations of heavy metals in samples taken from mined streams did not exceed State water quality standards in the absence of elevated total suspended sediment.

Similarly, any increase in biological constituents is not expected to be major, with proper sedimentation controls. The effect on groundwater chemistry and surface-subsurface hydraulic contact (Section 3.4) cannot be quantified by the existing data, but is related to the amount and distribution of sediment deposition.

There would be no significant impact on the overall water quantity of Fortymile River under any of the alternatives because placer mining is generally a non-consumptive use of water. Localized decreases in water quantity would occur between the intake and outfall at each operation. Other changes may occur through cementation of the stream bed with sediment as discussed in Chapter Three. This effect is not possible to quantify with existing data. Stream response to storms was not quantitatively assessed due to lack of data for areas impacted by placer mining. Response time would be decreased by such factors as shortening the length of the channel, reducing channel roughness by sedimentation, and decreasing retention by removal of vegetation. Response time would be increased by such factors as an increased active layer resulting from the thawing of the soils and removal of impermeable clay strata, and diversion and retention of surface flows in process water treatment systems.

Hazardous Materials

Considering the types and amounts of hazardous materials (mainly fuel and oil) used by small placer mining operations, the lack of long-term storage of large quantities, and the lack of any history of significant spills requiring clean-up or mitigation, it is not anticipated that there would be a significant cumulative impact to the environment from hazardous materials under any of the alternatives. Implementation of the State waste treatment and disposal regulations will make such impact even less likely in the future.

Conclusions

Exact predictions of impacts from turbidity and the sedimentation of the streambed are not possible. However, available data indicate that the discharge of effluent from active, operating mines and suction dredges does not make a significant contribution to water quality deterioration in the watershed. If water quality standards are enforced as they have been recently, deterioration of water quality due to mining activity would not be noticeable beyond that which is due to the sediments contributed from natural (background) sources. Elevated levels of certain chemical constituents can be expected as discussed in Chapter Three. The contribution of sediment from the non-point sources is unknown and cannot be adequately quantified with the existing data, but the trend is not expected to be major. These conclusions apply to all of the alternatives.

4.4.1 Proposed Action

Under this alternative, the projections are:

1) By 1998, the number of active mines would increase from 33 to 40. Acreage disturbed would be 920 acres with reclamation on 560 acres. See Appendix B-1 for a discussion of mining projections.

2) All operators would be required to meet the State of Alaska water quality standards and EPA effluent limitation guidelines or obtain the appropriate variances. Responsibility to enforce these standards would lie with those agencies. Any suspected violation of water quality standards would be reported to the appropriate agency for enforcement action.

3) Reclamation would consist of soil material stabilization, restoration of the diverted stream reaches to approximate premining characteristics in the original floodplain, i.e., configuration, flow velocity, and hydraulic gradient, reshaping of tailings to approximate the surrounding topography, and respreading of overburden and available topsoil over the reshaped tailings for operations on federal claims, which would account for approximately 55% of projected operations. Revegetation would be enhanced through the use of site-specific prescriptions for seeding or fertilizing. Reclamation for the remainder of the claims on State and private lands would consist of stabilizing topsoil and overburden and reshaping tailings at the end of each mining season.

Channel morphology would be directly affected in all areas where activities associated with mining occur in the active channel. Localized impacts to the biological community would occur as a result of in-channel operations and subsequent mining. There would be approximately 26 miles of channel affected on federal claims and 20 miles of channel affected on State claims and private mines.

Some direct effects on water quality can be anticipated during the development stage of an operation due to the construction of settling ponds and stream bypasses, and through rechannelization of the stream, if required. This would result in short-term increases in sediment levels and turbidity while equipment operates in the active stream channel. For most placer operations during the

production phase, discharge of sediments into the stream would occur through the process water treatment system as well as non-point input from disturbed areas. It is also likely that occasional high water or failure of water control structures would introduce sediments collected by the water treatment system into the stream channel. This would create short-term increases in turbidity levels and possible localized sedimentation of the stream substrate. The degree of impact from such an occurrence would depend on the amount of material released from the site and the flow at time of release. A treatment system breach under normal or low water stream conditions would most likely be detectable downstream for short periods of time. Treatment system breach or non-point discharge during a storm would have a minor impact given existing stream conditions.

Suction dredge mining, under certain circumstances, may contribute to increased pollution of free flowing water. Suction dredges operate without settling ponds and do not recycle used water; discharge is directly into a live stream. Ancillary mining activities have the potential to contribute to the degradation of water quality through fuel spills, litter, improper waste disposal, and storage of equipment and materials.

Sedimentation and turbidity generated by suction dredge mining on the riverbed are generally not recognized as a problem. But mining close to, or within, the vegetation line where the overall percentage of sand and silt is higher would increase the total amount of settleable and suspended solid discharge. The increase would be realized during and after mining, through direct discharge and erosion of the shoreland.

Water is important to the subsistence lifestyle of rural Alaskans. Bureau of Land Management.

Mining in proximity to other dredges, in the mixing zones of the upstream operations, may contribute to site-specific and cumulative downstream turbidity. Leveling of submerged suction dredge tailings during the mining season would add unnecessarily to turbidity and the sediment load. Equipment and materials stored on the shoreland are subject to flood risk and may contribute to littering and polluting the shoreline and water column.

In previous years substantial increases in turbidity were reported and assumed to be linked to mining activity. Recent samples (Mack et al. 1988) indicate that, with the exception of occasional events, incremental impacts to water quality are below levels that have an effect on biological communities. Impact of changes to water quality on other users is not known, but at current levels is not expected to have a major affect.

Indirect impacts to water quality would occur through accelerated erosion from placer operations. These impacts are expected to continue until mining ends and successful revegetation of the site is achieved. Channel cutting will also occur until the stream reaches equilibrium. These processes will introduce sediment into the stream system, particularly during spring breakup and flood. By requiring federal operators to stabilize their operations site, there should be a reduction in the amount of non-point erosion, and the corresponding sedimentation and turbidity. Because the federal operations represent only a portion of the total number of operations in the watershed, and similar requirements would not be in effect on operations on State and private lands, it is likely that current impacts to water quality would continue at a somewhat reduced level. These impacts could be expected to decrease after cessation of all mining until successful revegetation of the disturbed areas and flushing and stabilization of the channel has occurred. It is projected that revegetation would take 30-50 years on federal claims, and 50 years or more where such reclamation does not occur (see Landcover, Section 4.5). Channel stabilization and flushing of the streambed is a gradual process that depends on the occurrence of low-period floods.

The impact of placer mining from federal non-point sources undoubtedly would result in some contribution to the sediment load of the stream system. However, this analysis indicates, with the possible exception of surface flow from large storms, that the downstream effect from non-point sources under the Proposed Action would be indistinguishable from expected natural conditions.

There is no information in the current literature on the production of sediments from roads and trails in the basin. The primary sources of sediment production are stream crossings, roadways directly adjacent to stream channels, and improved roads and trails which converge down-gradient to stream channels and lack runoff control or sediment traps. There are substantial amounts of road segments along the stream channel. It is anticipated that the majority of the erosion from road surfaces would be quickly intercepted and contained by the surrounding vegetation.

The exact quantity of sediment moved through the system by the Fortymile River is not identifiable with current data due to the variables involved in sediment transport theory. However, the BLM estimated the sediment load of the Proposed Action using the sediment model discussed at the beginning of Section 4.4 for comparison purposes between the alternatives. The estimate for natural soil loss and erosion from the Fortymile River watershed is approximately 178,600 tons per year, or about 893 tons per day based on a 200-day open water season (See Appendix E-1).

Total erosion is expected to increase to 269,400 tons per year (1,347 tons per day) by 1998 under the Proposed Action (see Appendix E-1). This estimate is consistent with that derived from Selkregg (1974).

4.4.2 Alternative A

Under this alternative, the projections are:

1) By 1998 there would be 35 mining operations in the watershed, resulting in a total disturbance of 805 acres with 490 acres reclaimed. About 55% of these disturbances would be on federal claims.

2) All mining operations would meet water quality performance standards of 0.2 ml/l settleable solids and 5 NTU (Section 2.3). No water quality variances would be allowed under this alternative.

3) Reclamation on all operations would consist of stabilization of topsoil and overburden, reshaping of tailings, and stabilization of stream channel or bypass. Redistribution of overburden and topsoil over tailings and reestablishment and restoration of the original stream channel would not be required.

Qualitative impacts to water resources under this alternative would essentially be the same as those addressed under the Proposed Action. The primary difference would be the emphasis on achieving compliance with the 5 NTU turbidity standard. Reducing the requirement for reclamation may result in increased input of sediments from disturbed areas until a protective vegetative mat is reestablished. However, such input should be largely restricted to non-point discharge resulting from storms.

Approximately 23 miles of channel on federal claims and 17 miles of channel on State and private operations would be affected. This slight decrease in impact over that of the Proposed Action results from the expectation of a decrease in activity due to more stringent water quality requirements. However, the potential increase in non-point source sedimentation from disturbed areas may balance out the long-term effects of this alternative and the Proposed Action.

Some direct effects on water quality can be anticipated during the development stage of an operation due to the construction of settling ponds and stream bypasses, and through rechannelization of the stream, if required. This would result in short-term increases in sediment levels and turbidity while equipment operates in the active stream channel.

Under this alternative there may be a slight improvement in the direct impacts to water quality over the 1987 season. All operators would be required to meet the water quality standards. The settleable solids and turbidity standards would be met most of the time and there would be a reduction in the sediment load of Fortymile River. There should be a resultant decrease in turbidity as well, which is not quantifiable with existing data.

4.4.3 Alternative B

Projections are the same as Alternative A, except that reclamation would include the stockpiling and stabilization of disturbed topsoil and overburden and its redistribution over the reshaped tailings after completion of mining to facilitate natural revegetation of the site.

Because the management of effluent discharge and projections of the mining activity are the same as in Alternative A, direct impacts to water quality under this alternative would be identical to those discussed in Alternative A. As discussed, some direct effects on water quality could be expected during the development stage of an operation.

The effects on channel morphology from the implementation of this alternative will be similar to those presented under Alternative A. The additional mitigation and reclamation required on federal claims should reduce the input of sediment to the stream, and thus the sediment load. The majority of the contribution to sediment loads from mining would likely be due to State and private operations. Given the existing situation, the reduction is not expected to have a significant impact on the forces required to achieve reestablishment of a natural channel. There is potential for a slight reduction in mineral and organic input to the stream, affecting chemical water quality.

The indirect impact on water quality would be temporally less than under the previous alternative due to reclamation practices, which reduce the time for establishment of stable banks and vegetative cover. Estimates of the time required for revegetation of the disturbed area are 30 to 50 years (see Landcover, Section 4.5).

4.4.4 Alternative C

Under this alternative, the projections are:

1) By 1998 there would be 30 mining operations in the watershed, resulting in a total disturbance of 690 acres with 420 acres reclaimed. About 55% of these disturbances would be on federal claims.

2) All mining operations would meet water quality performance standards of 0.0 ml/l settleable solids and 0 NTU above natural conditions. No variances would be allowed under this alternative.

3) Reclamation for all operations would consist of reshaping of tailings, respreading of topsoil and overburden, and enhanced restoration, which may include the redistribution of captured fine sediments over shaped tailings, selective seeding or planting of reclaimed area, and/or reconstruction of the stream channel to restore or enhance fish habitat.

The "zero ml/l settleable solids/zero NTU" standard is intended to minimize the impact of placer mining operations on water quality. Some direct effects on water quality can be anticipated during the development stage of an operation. This would result in short term increases in sediment

levels and turbidity while equipment operates in the active stream channel and during the period required for stabilization. During the production phase of operations, if "zero discharge" was truly attained, there would be no direct impact on water quality from mining operations. However, it is likely that occasional high water or failure of water control structures would introduce sediments collected by the water treatment system into the stream channel. This would create short-term increases in turbidity and sediment load levels and possible localized sedimentation of the stream substrate. The degree of impact would depend on the amount of material released from the site and the streamflow at the time of release. Restoration of the stream channel would occur on all operations. This would reduce the period required for channel recovery in those areas affected.

Indirect impacts on water quality would occur through non-point source erosion from disturbed areas. Production of sediment from the channel would also occur until the stream reaches equilibrium. These processes would introduce sediment to the stream system, particularly during spring breakup and floods, until successful stabilization and revegetation occurs (see Landcover, Section 4.5). Impact from federal operations would largely be limited to non-point source discharge from storms or accidental discharge from disrupted water treatment systems.

The impact on chemical water quality is similar to that discussed under Alternative A. The additional mitigation and reclamation required should result in a decrease in the contribution of mineral and organic constituents from all operations. It is not currently possible to quantify the impact on water resources downstream with the data available.

The sediment load rate per acre would be reduced slightly from that of the Proposed Action due to stricter water quality performance standards and due to the conformance of State and private operations; however, the magnitude of change cannot be quantified with existing data. Approximately 21 miles of stream channel on federal claims and 14 miles of stream channel on State claims and private mines would be affected by mining operations.

4.4.5 Alternative D

Under this alternative, the projections are:

1) By 1998 there would be 17 mining operations in the watershed, resulting in a total disturbance of 391 acres with 238 acres reclaimed. None of this disturbance would be on federal claims.

2) Limited stabilization would occur on federal claims disturbed after 1980, and reclamation would proceed by natural processes. Reclamation on State and private operations would be to the standards of Alternative A.

Alternative D is the "no-action" alternative as defined by the District Court. Mining would cease on all federal claims under this alternative.

Because placer mining is generally a non-consumptive use of water, there would be no significant impact on the overall water quantity of Fortymile River under this alternative. Very localized changes in water quantity could occur through cementation of the streambed with sediment as discussed in Chapter Three. This effect is not possible to quantify with existing data.

Indirect impacts on water quality would occur through accelerated erosion from areas disturbed until fully successful revegetation of the site is achieved. This could take at least 50 years on unreclaimed sites. Channel cutting would also occur until the stream reaches equilibrium. These processes would introduce sediment to the stream system, particularly during the spring breakup and during floods. The degree of impact is not expected to be large.

Sediment input from federal claims would slowly decline as stabilization of disturbed sites occurs. Sediment input from State claims and private mines would continue much as in the past. Inchannel suction dredging would be unaffected by reclamation measures taken under this option. Stabilization of the stream channel would be enhanced by reclamation measures on federal claims for post-1980 disturbances.

4.4.6 Special Considerations

Cumulative Impacts

Total cumulative impacts to water resources consist of past and present impacts in addition to those impacts discussed under each alternative. Historic mining has disturbed approximately 85 miles of the streambeds of the Fortymile River and its tributaries. The major areas of impact are on Walker Fork and Wade Creek, with moderate amounts on Chicken Creek, Squaw Gulch, Willow and Canyon Creeks, and the mainstem of the Fortymile River. Other mining disturbances are scattered throughout the other tributaries of the watershed. The mining activity of 1987 disturbed an estimated 4.75 miles of stream, some of it in areas of previously disturbed floodplain. Mined reaches of the Fortymile River and tributaries which have been mined with cats and sluices or dredges are generally characterized by straight, shallow, high velocity, and frequently split stream channels with unstable banks.

Suction dredging activities have been occurring in some stretches of the Fortymile River in recent years. BLM estimates that less than three miles of river bed have been disturbed by suction dredging. No monitoring studies have been conducted to determine the total amount of area mined each year. By observation and calculation, the total amount is small when compared to the total riverbed area on navigable segments. Appendix C-4 provides an estimate of riverbed disturbance in 1987 based on the estimated amount of material processed by suction dredges during that year.

Future mining in previously mined areas may result in reclamation of portions of the stream channel under the performance standards of the Proposed Action and Alternative C. Up to 46 miles of stream channel may be mined and reclaimed under the Proposed Action. Estimating that 50% of the mining is on old disturbance, a total of 62 miles of unreclaimed stream channel in the water-

shed would result by 1998. Alternatives A and B would disturb up to 40 additional miles of stream channel, for a total of 125 miles. Alternative C would result in up to 68 miles of total unreclaimed stream. The 85 miles of currently unreclaimed channel, plus up to 19.5 additional miles from non-federal operations would remain under Alternative D, for a total of 104.5 miles.

The lack of historic, long-term water quality data collected during previous mining activities in this watershed prevents a strict quantification of the cumulative impacts to water quality. Turbidity from non-point sources would probably continue under all mining alternatives. Based on the potential disturbed acreage and the proposed reclamation standards under each scenario, they are listed here in increasing relative order of impact from non-point source erosion: Alternative C, Alternative D, Proposed Action, Alternative B, and Alternative A.

Unavoidable Adverse Impacts

Unavoidable adverse impacts are short- to long-term increases in suspended sediment and turbidity, accelerated erosion from disturbed areas resulting in a secondary increase in sediment introduced to the stream system, and changes in channel morphology in the vicinity of the disturbed areas. With the exception of sediments that have settled in the stream channel and other depositional zones, discharged sediments are flushed by annual break-up or floods. Deposition in the downstream areas would continue until such materials are moved through the system by major flood events. It is expected that there would also be an increase in some mineral and organic constituents, and localized reductions in flow between intake and outfall. No information is currently available on the sediment deposition in the stream channel. Available data indicate that there is no major impact to water quality in the basin due to mining activities. This situation is expected to continue under all of the alternatives evaluated.

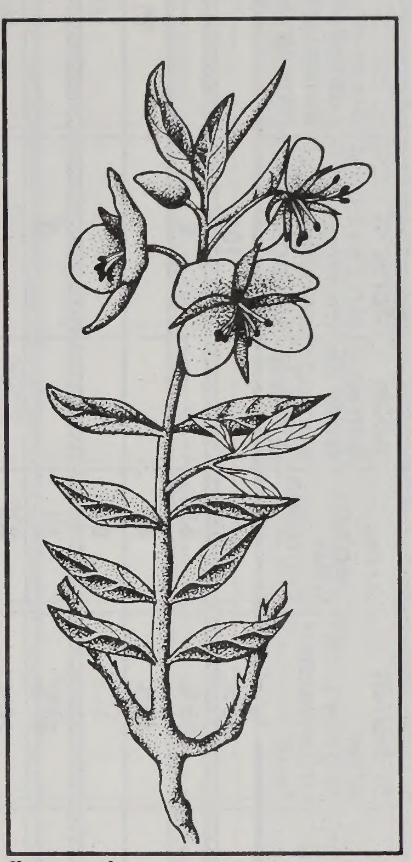
Short-Term Uses vs Long-Term Productivity

The short-term productivity of the stream would be affected by placer operations until stability and equilibrium are reestablished. Channel shortening would remain after cessation of mining until the occurrence of a low-period flood. Cementation of the stream bed and isolation of the surface and subsurface waters may occur on the Fortymile River. Sediment deposition would gradually decline until stabilization of stream banks and reestablishment of the stream channel occurs.

Irreversible and Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitments of the water resources under the Proposed Action or any of the Alternatives. Water quantity should not be significantly affected and water quality would return to approximately natural conditions after successful stabilization of the disturbed area and stream channel.

4.5 Landcover



fireweed

Analysis of acreages affected by mining and reclamation is based on projected disturbance for mining and associated claim access roads and trails (Appendix D-1). Estimates of acreages for all alternatives are in Figure 4-1.

The major variation among alternatives which would affect landcover is the relative amount of fine materials remixed in the tailings during reclamation. This fine material content affects both the rate of regrowth and the acreage which would recover to a stable productive vegetative community.

The rate of succession seems to be heavily influenced by the proportions of particles of silt and clay size in the surface layer of the tailings. Rutherford and Meyer (1981), reporting on 30 to 40-year-old communities on dredged tailings in the Tuluksak River, documented that the growth of sparsely vegetated shrubs through dense tall shrub stands depended on soil particle size. With an increase in fines from 10% to greater than 50% there was a corresponding increase in the amount of cover, vegetation height, and species diversity. Holmes (1981), working on 50-year-old dredge tailings on Goldstream Creek at Fox, reports similar findings, with slightly longer time frames. This would be in keeping with the more northerly site. Halloran (1986), working on both recent and old tailings in the Birch Creek drainage, Circle Mining District, found that vegetation development was enhanced in areas with greater fines content. This work included data on an undisturbed site with fines content of greater than 50%, while tailing samples ranged from less than 10% to approximately 50% fines.

Observations by BLM (Spencer 1987) during the summer of 1987 in the Chatanika and Birch Creek watersheds support these interpretations. Small willow seedlings from five to seven years old were seen on tailings with moderate fines content on Faith and Portage Creeks, along with tall willows aged 17 years on tailings over 30 years old at the tailings/water interface on Deadwood Creek. Also noted was a tall alder/willow community on 40-year-old, well-drained tailings on Switch Creek, and dense grasses and willow shoots covering areas that had been stripped the previous year, but not sluiced. Regrowth rates are reported to be less for some areas of the Fortymile drainage.

Figure 4-2 illustrates various rates of succession on substrates with different percentages of sub-sand sized fine materials. Analysis of the impacts of the alternatives is largely based on the differing regrowth rates resulting from different reclamation techniques and the mix of fine materials in the tailings.

		Acres disturbed from mining	Acres disturbed from roads	Acres disturbed from trails	Acres reclaimed	% barren after regrowth on reclaimed land	% barren after regrowth on unreclaimed land	Acres barren after regrowth	Acres barren from all mining & roads	Acres of successional community on dredged tailings	Acres of successional community on new ground
	Pre – 81	1,050	178	194			85%	892		158	
1987	Federal (old)					85%	85%	50		8	
	Federal (new					75%	75%	44			15
	Total federal	118	178	194	56			94			
	State (old)					85%	85%	51		9	
	State (new)					75%	75%	45			15
	Total state	120	81	22	5			96			
	Joint road		180	75							
	Total	238	439	291	51			176	1,508	175	28
Proposed Action	Federal (old)					50%	85%	168		40	
	Federal (new)					40%	75%	142			122
	Total federal	529	572	148	322			310			
	State (old)					50%	85%	124		29	
	State (new)					40%	75%	105			91
	Total state	391	150	20	238			229			
	Joint roads		377	67							
	Total 1998	920	1,099	235	560			540	2,532	227	213
Alternative A	Federal (old)					85%	85%	195		35	
	Federal (new)					75%	75%	173			57
	Total federal	460	455	129	238			368			
	State (old)					85%	85%	147		26	
	State (new)					75%	75%	129			43
	Total state	345	131	18	210			276			
	Joint roads		328	58							
	Total 1998	805	914	205	490			644	2,450	219	100

CONTINUATION

		Acres disturbed from mining	Acres disturbed from roads	Acres disturbed from trails	Acres reclaimed	% barren after regrowth on reclaimed land	% barren after regrowth on unreclaimed land	Acres barren after regrowth	Acres barren from all mining & roads	Acres of successional community on dredged tailings	Acres of successional community on new ground
Alternative B	Federal (old)					85%	85%	195		35	
	Federal (new)					40%	75%	123			106
	Total federal	460	455	129	280			319			
	State (old)					85%	85%	147		26	
	State (new)					40%	75%	92			80
	Total state	345	131	14	210			239			
	Joint roads		328	58							
	Total 1998	805	914	205	490			558	2,364	219	186
Alternative C	Federal (old)					50%	85%	132		75	
	Federal (new)					40%	75%	111			96
	Total federal	414	382	108	252			243			
	State (old)					50%	85%	88		50	
	State (new)					40%	75%	74			64
	Total state	276	110	14	168			162			
	Joint roads		275	49							
	Total 1998	690	767	171	420			405	2,064	283	160
Alternative D	Federal (old)					85%	85%	0		0	
	Federal (new)					40%	75%	0			0
	Total federal	0	178	164	0			0			
	State (old)					85%	85%	166		29	
	State (new)					40%	75%	105			90
	Total state	391	527	252	238			271			
	Joint roads		0	0							
	Total 1998	391	705	416	238			271	1,869	187	90

Figure 4 – 1. Estimates for impacts of placer mining on landcover. Disturbance of "old" ground refers to previously mined, often dredged, areas. "New" ground is previously unmined, and revegetation estimates are based on sluicing operations. "State includes claims on state land and all private operations. Blank spaces indicate data not applicable or not available.

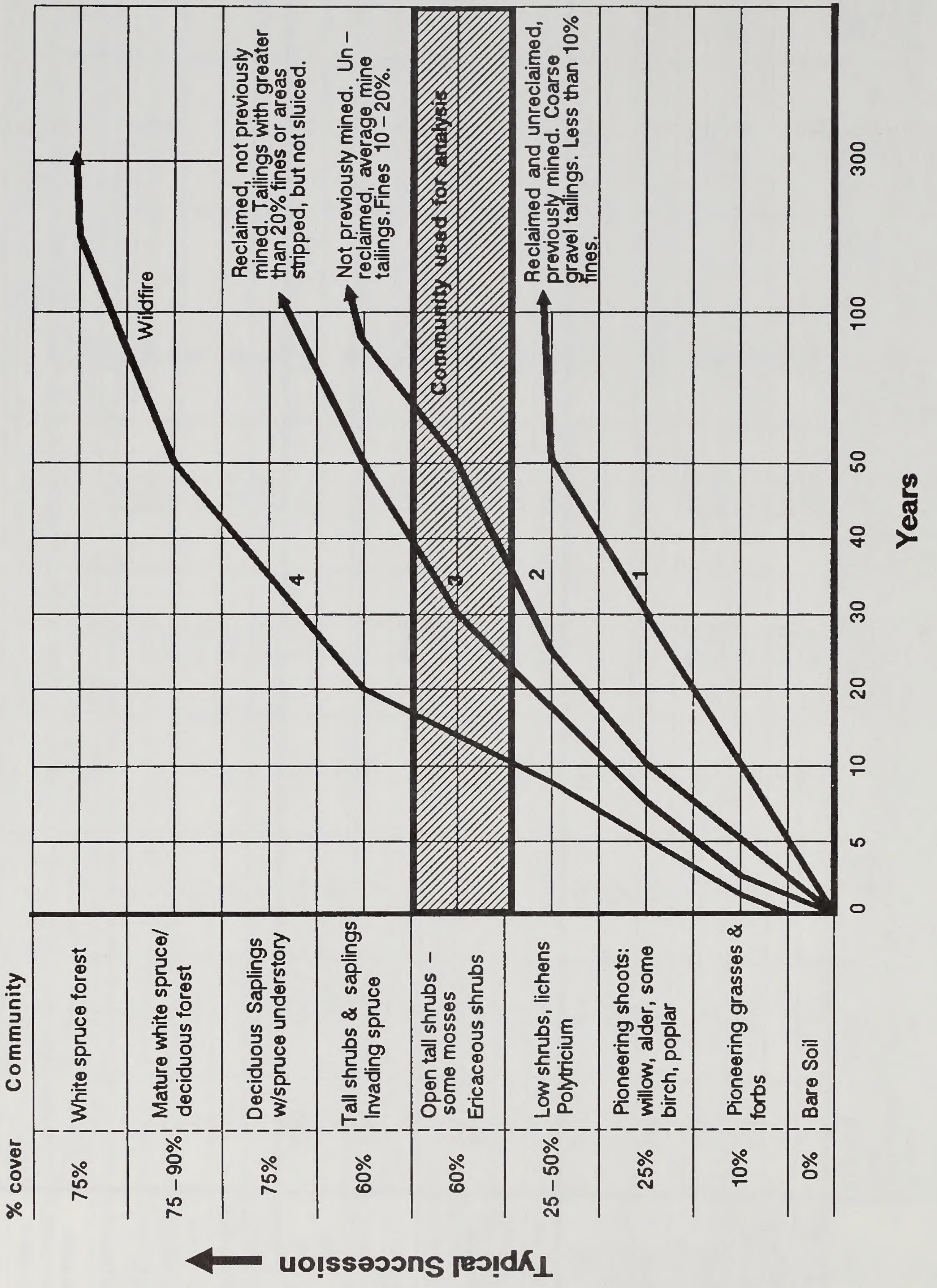


Figure 4 – 2. Comparison of succession rates after various reclamation approaches and natural wildfire.

Figure 4-2 was developed using data from studies and observations of regrowth on tailings (Rutherford & Meyer 1981, Holmes 1981, Halloran 1986, Spencer 1987). The four arrowed lines represent **average** time frames for succession to various vegetation communities. Most disturbed areas in the Fortymile River watershed would follow this or a similar pattern of native species regrowth. Length of time for vegetation reestablishment varies greatly between sites. Factors contributing to the length of time include microclimate and topography, sources of seeds or shoots for reestablishment, what type of plants become reestablished, and the nature and frequency of additional disturbance to the site. Cumulative effects become apparent when the disturbed area is large enough to influence seed dispersal into barren ground, or when repeated disturbances such as remining old tailings maintain one of the pioneering communities.

A stable, sustaining productive community is considered to be the open tall shrub (over one meter) community, shown on Figure 4-2. This community was selected as a base for comparison of regrowth rates among the alternatives, and is described in Section 3.5.3. The tall shrub community was selected for comparison of the alternatives because it represents a successional stage that is stable, may last for a decade or more, is habitat for a variety of wildlife species, and grows on productive soil materials. It is generally a tall willow and/or alder community with a canopy cover of at least 50%, where dying vegetation is replaced by seed or vegetative means. Such a community can sustain moderate pressure from wildlife, especially beaver or browsing moose, and may continue on the site indefinitely, or be successional to a deciduous forest with mixed spruce. The tall shrub community is usually well established within 25 to 50 years after mining disturbance. Prior to that time, earlier successional species of grasses, forbs, and lower shrubs will occupy the site, providing cover and soil stabilization. Several observers have reported shorter regrowth time for some areas in the Fortymile River watershed (Kukowski 1988, Burns 1988).

The Corps of Engineers (1988) analyzes the impacts of placer mining and associated activity on wetlands as:

> "Major impacts to wetlands within the Fortymile River watershed due to placer mining activities cannot be quantitatively analyzed with existing data. However, it is estimated that over 50% of the total acreage to be disturbed by mining are wetlands of various types or other waters of the United States. The local area of disturbance will be adversely impacted due to the loss of these wetlands and aquatic areas and their associated values and functions. This loss of function and value is the result of the direct removal of wetland vegetation, including riparian vegetation, through clearing, overburden removal, stream diversions, stockpiling of materials, and the construction of foundation pads, new roads and trails and airstrips. Impacts from stream diversions and loss of riparian vegetation have been discussed elsewhere in this assessment (Sections 4.4 and 4.5).
>
> "Other potential impacts include some of the following: compaction of organic surfaces from associated activities in permafrost areas could increase the active layer by reducing the integrity of the insulating vegetative mat resulting in settlement, ponding, material sloughing and thermal erosion; alteration of drainage patterns could affect local wetlands depending on topography--either through loss of water or the formation of future wetlands through water accumulation;

and, sedimentation which can create morphological changes to wetlands located downgrade from placer mining activities.

"There would be the potential for the loss of localized wetland ecosystems and their values. On a local basis this loss of wetland habitat could be major for migratory waterfowl, song birds and small mammal species, but it would not be significant on a greater than local basis. For birds of prey or larger mammal species, direct habitat loss would not be major in areas considered to be critical habitat for certain less mobile species. Removal of wetland vegetation in the case of riparian willow habitat would result in loss of valuable wildlife habitat.

"Indirect habitat loss because of noise, human contact or disturbances directly related to the placer mining operations could affect larger mammals and birds of prey which tend to avoid such areas. The degree of avoidance cannot be accurately predicted. Bears, wolves, wolverines and foxes may initially avoid these areas but would adjust to the intrusion in their range and return to the vicinity in search of food, etc.

"It is impossible to predict whether historic wetlands that originally occurred in many areas could be restored. Tailings and surface areas which have been impacted with placer tailing piles, or stripped of any soils as a result of earlier mining operations are not considered wetlands, nor in many cases have they returned to wetlands through natural succession. At some sites, where excavations for placer mining occurred (i.e. ponds for floating dredges, removal of ore-bearing materials, water retention basins, etc.) areas have become wetlands where time has permitted the invasion of wetland species, a development of hydric soils, and water persisted.

"Long-term benefits will be enhanced by promoting habitat of greater use to wildlife, such as willows for moose browse, settling ponds for waterfowl habitat enhancement, etc. Site specific mitigation measures may not require the leveling of berms, stream diversions returned to original channels, site drainage pattern maintenance, etc., during site rehabilitation, but could require that such structures be left intact to provide for the potential of wetland development.

"Although wetlands restoration is uncertain in many cases, wetlands reestablishment can be encouraged and substantially enhanced by using certain rehabilitation techniques. Regrading tailing piles and other disturbed areas to nearly level, creating ponds and depressions will provide a basis for water retainment; and most importantly, respreading organic soils, mulch and fines over the regraded area will provide a natural seed base and suitable conditions for relatively quick natural vegetation. To ensure this resource will be available for later use, those organics, topsoil and fines which overlay mineral bearing layers must be stockpiled and retained. Streamside, riparian and floodplain wetlands and those associated with high water tables such as springs and seep areas should begin to reestablish themselves within 5-7 years. Permafrost wetland areas may take considerably longer to reoccur, but intermediate successional vegetation such as willows will provide new browse areas for many species and will minimize long term impacts. Although some reestablishment of wetlands will occur within a few growing seasons in some areas, regaining the full function and values of the impacted wetlands

will take many years in most cases. Some may never be reestablished. Specific rehabilitation techniques would depend on site conditions.

> "The placement of dredged and fill materials in waters and wetlands requires a Department of the Army permit from the Corps of Engineers under Section 404 of the Clean Water Act. The decision whether a permit will be issued would be based on an evaluation of the probable impacts including cumulative impacts of the proposed activity and its intended use on the public interest. (Those permitting decisions can be tiered from the EIS documents.) Evaluation of the probable impacts on the public interest requires a weighing of all factors including the benefits which reasonably may be expected to accrue from the proposed activity and the reasonably foreseeable detriments. Among those factors relevant for consideration are conservation, economics, aesthetics, general environmental concerns, wetlands, cultural values, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shore erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership, and in general, the needs and welfare of the people. For activities involving Section 404 discharges, a permit will be denied if the discharge that would be authorized by such permit would not comply with the Environmental Protection Agency's 404(b)(1) guidelines (40 CFR, Part 230)." (Corps 1988).

Mining prior to 1981 has resulted in surface disturbance to approximately 1,050 acres in the Fortymile River watershed. Four hundred thirty-nine acres are used for roads, and an additional 290 acres are used for trails.

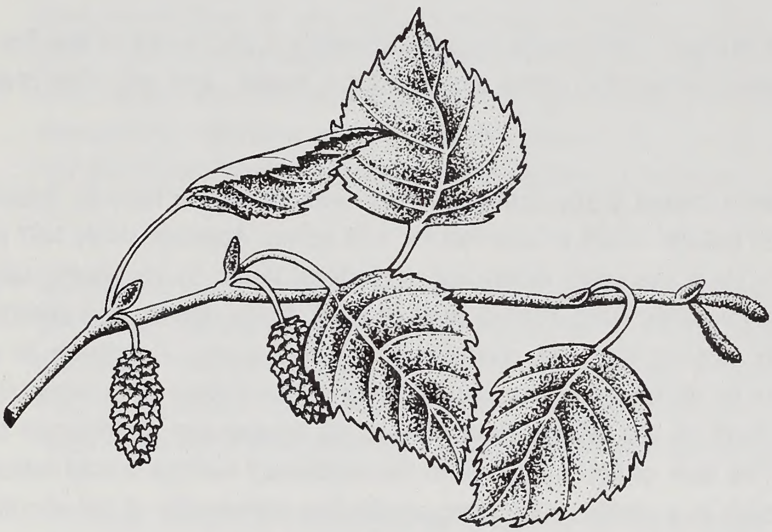
During 1987, a total of 238 acres were mined in the Fortymile River watershed on federal, State, and private mining claims. Claims on federal lands accounted for 118 acres. Approximately half of this mining was on old tailings. Fifty-six acres were reclaimed on federal lands by reshaping tailings and respreading topsoil where available from mining new ground. State claims and private operations covered 120 acres, with varying types of reclamation on five acres. Regrowth to a stable, sustaining, tall shrub community on mined areas of new ground would take approximately 30 years. Areas which are being mined on old tailings have little to no topsoil and overburden to spread over the reshaped tailings. The lack of fine materials in the reclaimed tailings would retard rapid regrowth of vegetation. Regrowth to a stable, sustaining productive community of tall shrubs would take approximately 50 years (Figure 4-2). Prior to that, this area would have low value for big game habitat, especially for use as browse by moose during winter (Section 4.6).

4.5.1 Proposed Action

As future federal mining operations disturb new ground, topsoil and overburden would be stockpiled for respreading over the tailings. The length of time to grow to a stable, productive community of tall shrubs would be approximately 25-30 years for disturbance on new ground. Further disturbance on old dredged or mined tailings would take approximately 30-50 years for regrowth. The difference in regrowth rates would be largely attributable to the higher proportion of fine-grained materials in tailings from mining new ground.

The Proposed Action for federal claims would require that topsoil and overburden be saved and respread over contoured tailings. With the mining in old tailings, another source of fine materials is necessary to facilitate natural revegetation of the site. One possible source would be fines from the abandoned settling ponds. Further enhancement such as fertilization and seeding may be required by BLM in approving individual Plans of Operations. Neiland (1978) and Peterson and Peterson (1977) point out that fertilization and seeding with domestic species tends to encourage non-native species at the expense of establishment by native species. Both suggest a combination of techniques to facilitate quick regrowth of vegetation to reduce erosion, and to enhance eventual establishment of a community of native plants. Mowatt (DOI 1987e) outlines many mitigation techniques for preparing soils, as well as considerations for revegetation of tailings during reclamation. The details of such work would have to be site-specific, and specified in the individual Plan of Operations for the mine.

On a site where a variety of techniques are used, including mixing of settling pond fine materials in the tailings, fertilization, seeding, and mulching to enhance regrowth, a stable sustaining community of tall shrubs would be established in approximately 25-30 years. The percentage of permanently barren and sparsely vegetated land would be approximately 40-50%.



Birch branch

Under the Proposed Action, 920 acres of additional mining disturbance are projected by 1998. Operations on federal lands are projected to disturb 529 acres, with an additional 391 acres on State claims and private lands. Three hundred and twenty-two of these disturbed acres would be reclaimed on federal claims. Reclamation on State claims and private mines would be 238 acres with standards similar to those of Alternative A. Projected mining activity would probably be concentrated in the upper tributaries of Wade Creek, Walker Fork, the vicinity of Chicken, and other areas. Using the calculations discussed in Appendix D-1, 213 acres would regrow to a riparian tall shrub community within 30 years of reclamation, and an additional 325 acres within 50 years on mining disturbance in creek bottoms. Five hundred and forty acres of new mining disturbance would remain barren or sparsely vegetated (Figure 4-1).

The roads would remain barren indefinitely, removing 1,100 acres of upland vegetation. The probable routes of these roads generally transect stands of mature deciduous forest, sparse black spruce with willow patches, low and dwarf shrub tundra, and sparsely vegetated alpine tundra. New trails in the area would impact 235 acres of the watershed. Vegetation would not be totally

removed, but other impacts would include ponding of water in low areas, compaction of soils, and vegetational changes in the disturbed areas along the trail.

4.5.2 Alternative A

Reclamation for this alternative does not require saving or respreading available topsoil over the tailings. The lack of fine materials in the reclaimed tailings would retard rapid regrowth of vegetation. Regrowth to a stable, sustaining productive community of tall shrubs would take approximately 50 years (Figure 4-2), similar to the rate of revegetation on unreclaimed washplant tailings.

Under Alternative A, an additional 805 acres of mining disturbance would be expected by 1998. Approximately 460 acres would be mined on federal claims, with nearly 345 acres mined on State land and private holdings. Four hundred and ninety acres (280 acres federal and 210 acres on State and private) would be reclaimed under this alternative. One hundred acres of new disturbance would regrow to a riparian tall shrub community within 30 years of reclamation, and an additional 218 acres of mining disturbance in creek bottoms would regrow within 50 years. Six hundred and forty-four acres of new mining disturbance would remain barren or sparsely vegetated.

The roads would remain barren indefinitely, removing 914 acres of upland vegetation. The probable routes of these roads generally transect stands of mature deciduous forest, sparse black spruce with willow patches, low and dwarf shrub tundra, and sparsely vegetated alpine tundra. New trails would impact 205 acres of the watershed. Vegetation would not be totally removed, but other impacts include ponding of water, compaction of soils, and a change in the composition of the original vegetation community on the site.

4.5.3 Alternative B

Alternative B requires the saving and respreading of available topsoil and overburden over the tailings on federal claims. The rate of regrowth on old dredged tailings for this alternative would be 50 years, the same as the Proposed Action for mining in old tailings. Mining on new ground would have fine grained overburden and organic material available for reclamation. Newly mined ground would regrow to a tall shrub community in approximately 25-30 years.

Under Alternative B, an additional 805 acres of mining disturbance would be expected by 1998. State, private, and federal acreage of disturbance and reclamation would be the same as Alternative A. Projected mining activity would probably be concentrated in the upper tributaries of Wade Creek, Walker Fork, the vicinity of Chicken, and other areas. Using the calculations discussed in Appendix D-1, 186 acres would regrow to a riparian tall shrub community within 30 years of reclamation, and an additional 218 acres of mining disturbance in creek bottoms would regrow within 50 years. Five hundred and fifty-eight acres of new mining disturbance would remain barren or sparsely vegetated.

Effects from roads and trails would be the same as Alternative A.

4.5.4 Alternative C

Alternative C would require that topsoil and overburden be saved and respread over reshaped tailings similar to the standards of the Proposed Action. Further enhancement such as fertilization and seeding may be required by BLM in approving individual Plans of Operations. The details of this work would have to be site-specific, and specified in the individual Plans of Operation. All mines in the watershed would use these reclamation standards.

Lousewort/"Bumblebee Plant"

On a site where a variety of techniques are used, including mixing of settling pond fines in the tailings, fertilization, seeding, and mulching to enhance regrowth, a stable, sustaining community of tall shrubs would be established in approximately 25-30 years. Extent of permanently barren area would be approximately 40-50%.

Under Alternative C an additional 690 acres of mining disturbance are expected by 1998. Four hundred and fourteen acres are projected for mining on federal lands, with 276 acres on State and private lands. Reclamation would occur on 252 acres on federal operations, and 168 acres of State and private operations. Projected mining activity would probably be concentrated in the upper tributaries of Wade Creek, Walker Fork, the vicinity of Chicken, and other areas. Using the calculations discussed in Appendix D-1, 160 acres would regrow to a riparian tall shrub community within 25 to 30 years of reclamation, and an additional 287 acres within 50 years on mining disturbance in creek bottoms. Approximately 400 acres of new mining disturbance would remain barren or sparsely vegetated.

Effects on roads and trails would be the same as Alternative A except that 767 acres of vegetation would be removed for roads and 171 acres would be impacted from new trails.

4.5.5 Alternative D

Under this alternative there would be no further mining on federal claims in the watershed. The rate of regrowth would be very similar to Alternative A, with the existing disturbance becoming revegetated by natural processes. Old tailings (pre-1981) would not be reclaimed because there would be no further mining in those gravels. Future impacts listed below would come from mining on State claims and private lands; past impacts would carry over from historical mining on all lands.

Under Alternative D, by 1998 non-federal operations are projected to disturb an additional 391 acres, with reclamation standards similar to Alternative A on 238 acres. Regrowth by natural processes on new mining would take 40 to 50 years, depending on the location of the disturbed area. On newly mined lands, 90 acres would regrow to a tall shrub community. An additional 187 acres would regrow on old tailings in approximately 50 years. Roads would remain barren indefinitely, removing 705 acres of upland vegetation. Existing trails affect 416 acres. Vegetation is not totally removed on trails, but other impacts include ponding of water, compaction of soils, and a change in the composition of the original vegetation community. A total of 1,869 acres would remain barren or sparsely vegetated for a long period, including 892 acres of old tailings, 705 acres of roads, and 271 acres from additional mining on non-federal lands.

4.5.6 Special Considerations

Cumulative Impacts

Total cumulative impacts to landcover consist of past and current impacts in addition to those impacts discussed under each alternative. Some acreage that has been placer mined does not regrow vegetation, but remains barren or sparsely vegetated for a long time. Vegetation is also destroyed in areas of roads, and does not regrow as long as the roads are in use. In the mined tributaries of the Fortymile River, 890 of 1,050 acres disturbed would remain barren or sparsely vegetated 40-80 years after mining. The mining activity of 1987 is estimated to result in 190 acres of barren or sparsely vegetated land.

Under the Proposed Action, a total of 2,530 acres would remain barren or sparsely vegetated after a regrowth period of 25 to 30 years. Alternative A would result in a total 2,450 acres barren after 50 years, under Alternative B, 2,365 acres would remain barren after 30 to 50 years, under Alternative C, 2,065 acres after 25 to 30 years, and under Alternative D, 1,870 acres of historic and non-federal surface disturbance would remain barren or sparsely vegetated.

Unavoidable Adverse Impacts

During mining operations, the vegetation cover is destroyed in the areas of mines and roads. A short-term unavoidable loss of productivity is unavoidable. There is an unavoidable loss of the original riparian community, which is replaced by an earlier successional community, and soils, including permafrost, for 100 to 200 years.

Under the Proposed Action there would be a long-term cumulative unavoidable loss of 2,532 acres of vegetation. Under Alternative A there would be a long term unavoidable loss of 2,450 acres of vegetation. Under Alternative B there would be a long term unavoidable loss of 2,364 acres of vegetation cover. Under Alternative C there would be a long-term unavoidable loss of 2,064 acres of vegetation cover. Under Alternative D there would be a long-term unavoidable loss of 1,869 acres of vegetation.

Short-Term Uses vs Long-Term Productivity

The term "productivity," as used for vegetation, refers to the rate of biomass production, usually expressed as km/hectare/year. Early successional communities such as grass/forb stands often have higher rates of productivity than mature forest stands. The productivity of a mined site would be very low for several years (barren and sparsely vegetated), increase rapidly for 5 to 50 years after mining, then gradually begin to decrease as forest cover becomes reestablished.

Most of the existing mining disturbance in the valley dates from 1890 to the present. The area has regrown with a mosaic of barren and sparsely vegetated types, and tall shrubs. The sites which have regrown to a community of open tall shrubs of willow, birch, and balsam poplar have the same or higher productivity than that of the site's original riparian community. This regrowth has taken approximately 50 to 70 years post-mining disturbance (Figure 4-2). As succession proceeds toward mature deciduous or white spruce forest, productivity would gradually decline.

Irreversible and Irreversible Commitments of Resources

Not all areas become revegetated, rather they remain barren or sparsely vegetated for long periods (over 90 years) after mining and reclamation activities are complete. The amount of ground remaining barren depends on proportion of fine-grained materials in the reclaimed tails and other site-specific factors. This barren acreage is an irretrievable and irreversible loss of vegetation resources.

Under the Proposed Action, a total of 2,532 acres would be left barren. The barren area includes tailings from past mining (892 acres), new mining (540 acres), and all roads (1,100 acres). Under Alternative A, a total of 2,450 acres would be left barren. The barren area includes tailings from past mining and dredging (892 acres), additional mining (644 acres), and all roads (914 acres). Under Alternative B, a total of 2,365 acres would be left barren. This includes tailings from past mining and dredging (892 acres), additional mining (558 acres), and all roads (914 acres). Under Alternative C, a total of 2,064 acres would be left barren. This includes tailings from past mining and dredging (892 acres), additional mining (405 acres), and all roads (767 acres). Under Alternative D, a total of 1,869 acres would be left barren. This includes tailings from past mining, including dredging, additional mining on State and private lands, and all roads.

4.5.7 Threatened and Endangered Plants

Within the Fortymile River watershed study area there are no "listed" threatened or endangered plant species. There are, however, "candidate" threatened and endangered species found within the drainage, as well as recognized "endemic" plant species (Chapter Three). The existing surface management regulations (43 CFR 3809.2-2 (d)) apply. Assessments of proposed development sites, which are required under all alternatives causing disturbance, help to eliminate impact upon candidate threatened and endangered or endemic plants and their habitats. Therefore the cumulative effects upon these plant species would be similar for all alternatives.

BLM policy is to protect, conserve, and manage federally and State-listed threatened or endangered plant species and candidate plants, and to use existing BLM authority to further the purpose of the Endangered Species Act and similar State laws. BLM will ensure that actions which it authorizes, funds, or carries out will not jeopardize the continued existence of such species or result in the destruction or adverse modification of their critical habitats. Specifically, BLM will: 1) Evaluate information to determine the distribution, abundance, reasons for current status, and habitat needs for candidate species on BLM lands, and the significance of BLM lands and actions in maintaining those species. 2) Evaluate all information to determine whether it is adequate to make informed management decisions (BLM Manual Section 6840). Priority is given to species for which significant adverse impacts are anticipated or for which there is a high risk in not knowing population trends. The effectiveness of the initial habitat assessment for the Proposed Action is vital to the survival and conservation of these species.

Unavoidable Adverse Impacts

Any disturbance or impact upon candidate or endemic species constitutes undue degradation. However, at this time the potential unavoidable loss of endemic plant habitat due to mining in the Fortymile River watershed is unknown. It is beyond BLM's present capabilities to clear all sites of possible disturbance to endemic species because of incomplete taxonomic studies.

Short-Term Uses vs Long-Term Productivity

It is difficult to evaluate threatened, endangered, or sensitive plant species for short or long-term productivity because disturbance of a species may well lead to extinction in that particular area. Because of the pre-action assessments there should be no short or long-term threats on the Fortymile River watershed.

Irreversible and Irretrievable Commitments of Resources

There are no irretrievable or irreversible conditions threatening the species involved.

4.6 Wildlife

The degree of impact to wildlife habitat and populations resulting from mining-related activities depends on the location, timing, and frequency or extent of the activity. The format adopted to analyze and discuss the impacts of the Proposed Action and alternatives on wildlife resources includes those factors common to all alternatives and those specific to the Proposed Action and each alternative.

Analysis Approach

For the purpose of this analysis, mineral development activities were broken down into components. The major action components used to assess the environmental consequences of the Proposed Action and alternatives on wildlife resources are access, facilities, and operations (Figure 4-3).

ACCESS	FACILITIES	OPERATIONS
Type(s) and number of vehicle(s)	Number & size of structures	Type/amount of equipment
Materials transported	Size of pad(s)	Timing & duration of equipment operation
Location & length of route	Number, timing & duration of people present	Size of area stripped
Frequency of current route use	Type & amount of waste produced	Size of area mined
Frequency and duration of future route use	How often waste is disposed of	Size of various stockpiles
		Settling basin number & size
		Size of other surface disturbance

Figure 4-3. The three major components and subcomponents of mineral development used to assess impact on wildlife by the Proposed Action and the alternatives.

Analysis of the effects of access considered the type of vehicles involved, materials being transported, location and length of access route, how often and how long the route would be used. Subcomponents considered under facilities include the number and size of structures; the size of pads or camp areas; the timing, frequency, and duration of human activity; the type and amount of waste produced; and the frequency of waste disposal. Distinct aspects of the operation component included the type and number of equipment used, timing and overall duration of equipment use, size of the area to be stripped, size of the area to be mined, size of various stockpiles, number and size of settling basins, and the size of any other surface disturbances. This analysis assumes that mitigation measures or guidelines for State and private mining activities are similar to those required for federal operations, except for reclamation (Section 2.3).

General Impacts

The general potential impacts from the access, facilities, and operation components on the wildlife resource are identified in Figure 4-4. The levels of impact attributable to federal, State, and private mining and suction dredging activities for the Proposed Action and alternatives and are presented in detail in Sections 4.6.1 - 4.6.5.

ACCESS	FACILITIES	OPERATIONS
Direct (long term) habitat loss	Direct (long term) habitat loss	Direct (long term) habitat loss
Disturbance (short term)/ disruption	Disturbance (short term)/ disruption	Disturbance (short term)/ disruption
Increased (long term) harvest pressure	Removal (long term) of nuisance animals	Hazardous (long term) material spill
Potential (long term) increased habitat loss		

Figure 4-4. Potential impacts to wildlife from mineral development.

Potential impacts resulting from access include removal of wildlife habitat due to roads and trails, disturbance and/or disruption of wildlife movements and seasonal use areas due to boat and vehicular traffic, increased hunting/trapping pressure and other recreation use, and habitat destruction because of new or improved access into remote areas.

The potential impacts resulting from the facilities component are elimination of wildlife habitat due to the construction of gravel pads for structures; disturbance or disruption to wildlife due to human activity associated with the facility or campsite; and the removal of grizzly bear, black bear, or other animals attracted to solid waste.

Impacts from the operations component would result in loss of wildlife habitat due to removal or covering of vegetation by stripping, making mine cuts, stockpiling, and settling basins. Disturbance or disruption of wildlife would occur in the vicinity of the operation or dredge site due to noise from machinery and other activities. There is the unpredictable possibility of spilling hazardous materials such as gasoline, diesel fuel or oil which would result in contamination or loss of vegetation.

The type of mitigation or management control necessary to alleviate impacts to wildlife resources depends on the type, extent, and overall magnitude of the impact. Potential measures to avoid, minimize or rectify, and replace wildlife resources that may be impacted by mineral development are presented in Section 4.12.

4.6.1 Proposed Action

Access

Permanent gravel roads, excluding the Taylor Highway, would result in the loss of 1,099 acres of wildlife habitat in the Fortymile River watershed. Permanent gravel roads directly associated with federal mineral development would total 572 acres, those directly associated with State and private mineral development would total 150 acres, and those associated with federal, State, and private mineral developments would total 377 acres.

The establishment and use of 64.8 total miles of primitive roads and trails would result in 41,974 acres of wildlife habitat subject to short-term periodic disturbance by vehicular traffic when moose, caribou, and other species are present. The primitive roads and trails in the Fortymile River watershed would be used to access federal (26,550 acres subject to disturbance), State and private (4,086 acres subject to disturbance) and federal, and State, and private (12,342 acres subject to disturbance) mineral developments.

The level of vehicular use on roads and trails (excluding the Taylor Highway) would be low to moderate, and minimal alteration, disturbance, or disruption of wildlife movement routes and seasonal use areas is anticipated. The South Fork Fortymile River and mainstem Fortymile River between the South Fork bridge and O'Brien Creek bridge (39 river miles) would be the principal access route used by dredgers to access their camps and dredging sites. As a result, periodic dis-

turbance from operation of motor boats would occur along the South Fork and mainstem Fortymile River (29,255 acres) from June through September.

Improvement and expansion of trails and roads into Hutchinson Creek, Mount Warbelow, and other areas of the Fortymile River basin would indirectly result in increased harvest of moose, caribou, grizzly bear, black bear, furbearers, and other species.

Facilities

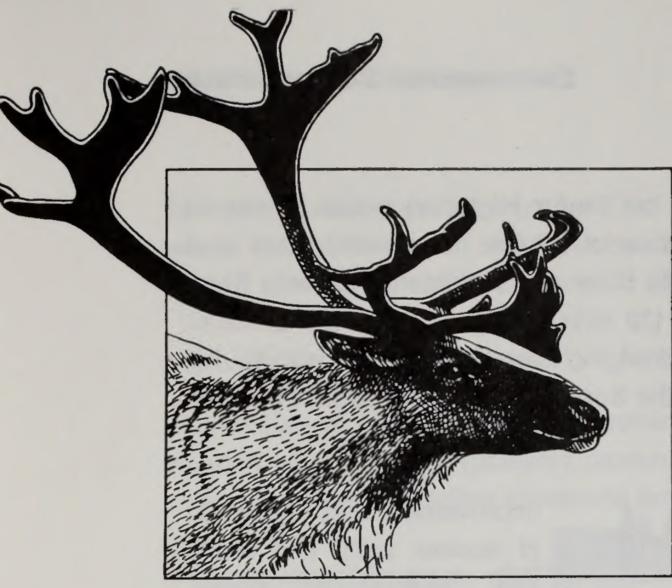
The presence of 40 mining camps with facilities and structures would result in the long-term loss of 40 acres of upland riparian habitat. Facilities directly associated with federal mineral development would total 23 acres, those associated with State and private mineral development total 17 acres, and 18 dredger campsites would total less than 18 acres. Similarly, 1,044 acres of riparian habitat used by moose and other species would be unavailable for the short-term due to frequent human disturbance from May through October. Disturbance at federal mineral development sites would account for 360 acres, while State and private activities comprise 414 acres of the total. Additional areas subject to disturbance at dredger campsites would be less than 324 acres. The removal of grizzly or black bears as nuisance animals could occur, due to their attraction to food, refuse, or solid waste in the vicinity of mining facilities and dredger campsites.

Operations

Activities associated with stripping, mine cuts, stockpiles, and settling basins would result in physical alteration of about 2,190 total acres of upland riparian habitat in Wade Creek, Walker Fork, the vicinity of Chicken, and other areas. The habitat lost to mining operations associated with federal mineral development would be 529 acres, and habitat losses associated with State and private operations would total 391 acres. Reclamation of federal mining areas would occur through leveling tailings, stockpiling and respreading overburden, and natural succession. Reclamation on State and private mining areas would consist of leveling tailings and natural succession. Revegetation in previously undisturbed federal mining areas would probably require 25-30 years, and revegetation in federal old tailing areas would require at least 30-50 years (Figure 4-2) to reach a stage suitable for moose browse. Revegetation in previously undisturbed State/private mining areas would require 30 to 50 years, and revegetation in State/private old tailing areas would require at least 50 years (Figure 4-2) to reach a stage suitable for moose browse. Wildlife may avoid 37,152 acres of riparian and upland habitat during the summer mining season due to noise from machinery and other mining activities. The area subject to periodic disturbance by noise from federal mining would be 11,546 acres, disturbance from State and private mining would be 8,534 acres, and disturbance from suction dredging (maximum 36 sites) would be 18,072 acres. Fuel spills could result in contamination or loss of wildlife habitat.

Conclusion

The effects of the Proposed Action are summarized in Figure 4-5. Approximately 3,329 acres of upland riparian wildlife habitat (primarily moose winter range) would be physically altered due to mining-related activities (including roads and facilities) in the Fortymile River.



Caribou

Periodic disturbances to wildlife due to use of roads and trails, operation of boats, vehicles, and machinery, and mining and dredging-related human habitation in the Fortymile River watershed totaling 227,044 acres could result in a low to moderate level of short-term adverse effects in localized areas, particularly from May through October. Low to moderate harvest of wildlife by people associated with mining and dredging activities is anticipated in localized areas of the Fortymile River. The principal long-term adverse effect of mining in the Fortymile River would be the unavoidable loss (even with reclamation) of approximately 920 acres of upland riparian habitat in Wade Creek, Walker Fork, the vicinity of Chicken, and other areas for a 25-30 year period. In addition, approximately 540 acres of the physically altered areas would remain permanently barren or support only sparse vegetation after 30 years. The long-term cumulative loss of habitat to federal (310 acres) and State/private (230 acres) mining activities in these areas of the Fortymile River may contribute to a low to moderate reduction in moose population potential.

The potential exists for long-term cumulative adverse effects to moose, caribou, raptors, furbearers, or other species if human use of the area increases greatly in crucial wildlife habitats (i.e., caribou calving, caribou movement routes, raptor nesting sites). Additionally, the potential exists for a greater long-term loss of crucial wildlife habitat from removal of vegetation due to an increase in mining activity. The long-term cumulative effects of potential future disturbance or disruption, and loss of habitat in crucial use areas, could be significant, depending on the specific location, timing, amount, and duration of the actions.

4.6.2 Alternative A

Access

Permanent gravel roads, excluding the Taylor Highway, would result in the loss of 915 acres of wildlife habitat in the Fortymile River watershed. Permanent gravel roads directly associated with federal mineral development would total 456 acres, those directly associated with State and private mineral development would total 131 acres, and those associated with federal, State, and private mineral developments would total 328 acres.

The establishment and use of 56.3 total miles of primitive roads and trails would result in 97,078 acres of wildlife habitat subject to short-term periodic disturbance by vehicular traffic when moose, caribou, and other species are present. The primitive roads and trails in the Fortymile River watershed would be used to access federal (48,630 acres subject to disturbance), State and private (14,326 acres subject to disturbance) and federal, State, and private (35,126 acres subject to disturbance) mineral developments.

The level of vehicular use on roads and trails (excluding the Taylor Highway) would be low to moderate, and minimal alteration, disturbance, or disruption of wildlife movement routes and seasonal use areas is anticipated. The South Fork Fortymile River and mainstem Fortymile River between the South Fork bridge and O'Brien Creek bridge (39 river miles) would be the principal access route used by dredgers to access their camps and dredging sites. As a result, periodic disturbance from operation of motor boats would occur along the South Fork and mainstem Fortymile River (29,255 acres) from June through September.

Moose

Improvement and expansion of access trails and roads into Hutchinson Creek, Mount Warbelow and other areas of the Fortymile River basin would indirectly result in increased harvest of moose, caribou, grizzly bear, black bear, furbearers, and other species.

Facilities

The presence of 35 mining camps with facilities and structures would result in the long-term loss of 35 acres of upland riparian habitat. Facilities directly associated with federal mineral development would total 20 acres, those associated with State and private mineral development total 15 acres, and 15 dredger campsites would total 15 acres. Similarly, 900 acres of riparian habitat used by moose and other species would be unavailable for the short term due to frequent human disturbance from May through October. Disturbance at federal mineral development sites would account for 360 acres, while State and private activities comprise 270 acres of the total. Additional areas subject to disturbance at dredger campsites would be less than 270 acres. The removal of grizzly or black bears as nuisance animals could occur due to their attraction to refuse, food, or solid waste in the vicinity of mining facilities and dredger campsites.

Operations

Activities associated with stripping, mine cuts, stockpiles, and settling basins would result in physical alteration of about 2,075 total acres of upland riparian habitat in Wade Creek, Walker Fork, the vicinity of Chicken, and other areas. The habitat lost to federal mining operations would be 460 acres and habitat losses associated with State and private operations would total 345 acres. Reclamation of federal mining areas would occur through leveling tailings and natural succession. Reclamation on State and private mining areas would be similar. Revegetation in previously undisturbed mining areas would probably require 30 to 50 years, and revegetation in old tailing areas would require at least 50 years (Figure 4-2) to reach a stage suitable for moose browse. Wildlife may avoid 40,181 acres of riparian and upland habitat during the summer mining season due to noise from machinery and other mining activities. The area subject to periodic disturbance

by noise from federal mining would be 10,061 acres, disturbance from State and private mining would be 7,530 acres, and disturbance from suction dredging (maximum 30 sites) would be 15,060 acres. Fuel spills may result in contamination or loss of wildlife habitat.

Conclusion

The effects of Alternative A are summarized in Figure 4-5. Approximately 3,073 acres of upland riparian wildlife habitat (primarily moose winter range) would be physically altered due to mining-related activities (including roads and facilities) in the Fortymile River watershed.

Periodic disturbances to wildlife due to use of roads and trails, operation of boats, vehicles and machinery, and mining and dredging-related human habitation in the Fortymile River watershed totaling 209,068 acres could result In a low to moderate level of short-term adverse effects in localized areas, particularly from May through October. Low to moderate harvest of wildlife by people associated with mining and dredging activities is anticipated in localized areas of the Fortymile River watershed. The principal long-term adverse effect of mining in the Fortymile River watershed would be the unavoidable loss (even with reclamation) of approximately 805 acres of the upland riparian habitat in Wade Creek, Walker Fork, the vicinity of Chicken, and other areas for a 30-50 year period. In addition, approximately 644 acres of the physically altered areas would remain permanently barren or support only sparse vegetation after 50 years. The long-term cumulative loss of habitat to federal (368 acres) and State/private (276 acres) mining activities in these areas of the Fortymile River watershed may contribute to a low to moderate reduction in moose population potential.

The potential exists for long-term cumulative adverse effects to moose, caribou, raptors, furbearers, or other species if human use of the area increases greatly in crucial wildlife habitats (i.e., caribou calving, caribou movement routes, raptor nesting sites). Additionally, the potential exists for a greater long-term loss of crucial wildlife habitat from removal of vegetation due to an increase in mining activity. The long-term cumulative effects of potential future disturbance or disruption, and loss of crucial habitat, could be significant, depending on the specific location, timing, amount, and duration of the actions.

4.6.3 Alternative B

Alternative B is similar to Alternative A except that about 558 acres of physically altered areas would remain permanently barren or support only sparse vegetation after 30-50 years. The long-term cumulative loss of habitat to federal mining activity totals 319 acres.

4.6.4 Alternative C

Access

Permanent gravel roads, excluding the Taylor Highway, would result in the loss of 767 acres of wildlife habitat in the Fortymile River watershed. Permanent gravel roads directly associated with

federal mineral development would total 382 acres, those directly associated with State and private mineral development would total 110 acres, and those associated with federal, State, and private mineral developments would total 275 acres.

The establishment and use of 47.2 total miles of primitive roads and trails would result in 30,710 acres of wildlife habitat subject to short-term periodic disturbance by vehicular traffic when moose, caribou, and others species are present. The primitive roads and trails in the Fortymile River would be used to access federal (19,510 acres subject to disturbance), State and private (3,062 acres subject to disturbance) and federal, State, and private (9,142 acres subject to disturbance) mineral developments.

Porcupine

The level of vehicular use on roads and trails (excluding the Taylor Highway) would be low to moderate, and minimal alteration, disturbance, or disruption of wildlife movement routes and seasonal use areas is anticipated. The South Fork Fortymile River and mainstem Fortymile River between the South Fork bridge and O'Brien Creek bridge (39 river miles) would be the principal access route used by dredgers to access their camps and dredging sites. As a result, periodic disturbance from operation of motor boats would occur along the South Fork and mainstem Fortymile River (29,255 acres) from June through September.

Improvement and expansion of trails and roads into Hutchinson Creek, Mount Warbelow and other areas of the Fortymile River basin would indirectly result in increased harvest of moose, caribou, grizzly bear, black bear, furbearers, and other species.

Facilities

The presence of 30 mining camps with facilities and structures would result in the long-term loss of 30 acres of upland riparian habitat. Facilities directly associated with federal mineral development would total 18 acres, those associated with State and private mineral development total 12 acres, and 10 dredger campsites would total less than 10 acres. Similarly, 720 acres of riparian habitat used by moose and other species would be unavailable for the short term due to frequent human disturbance from May through October. Disturbance at federal mineral development sites would account for 324 acres, while State and private activities comprise 216 acres of the total. Additional areas subject to disturbance at dredger campsites would be less than 180 acres. The removal of grizzly or black bears as nuisance animals could occur due to their attraction to food, refuse, or solid waste in the vicinity of mining facilities and dredger campsites.

Operations

Activities associated with stripping, mine cuts, stockpiles, and settling basins would result in physical alteration of about 1,960 total acres of upland riparian habitat in Wade Creek, Walker Fork, the vicinity of Chicken, and other areas. The habitat lost to federal mining operations would be 414 acres and habitat losses associated with State and private operations would total 276 acres. Reclamation of all mining areas would occur through reshaping tailings, stockpiling and respreading overburden, and facilitation of natural succession through possible fertilizing and seeding. Revegetation in previously undisturbed mining areas would probably require 25 years, and revegetation in old tailing areas would require at least 25-50 years (Figure 4-2) to reach a stage suitable for moose browse. Wildlife may avoid 25,121 acres of riparian and upland habitat during the summer mining season due to noise from machinery and other mining activities. The area subject to periodic disturbance by noise from federal mining would be 9,107 acres, disturbance from State and private mining would be 6,024 acres, and disturbance from suction dredging (maximum 20 sites) would be 10,040 acres. Fuel spills may result in contamination or loss of wildlife habitat.

Conclusion

The effects of Alternative C are summarized in Figure 4-5. Approximately 2,805 acres of upland riparian wildlife habitat (primarily moose winter range) would be physically altered due to mining related activities (including roads and facilities) in the Fortymile River watershed.

Periodic disturbances to wildlife due to use of roads and trails, operation of boats, vehicles, and machinery, and mining and dredging-related human habitation in the Fortymile River watershed totaling 172,002 acres could result in a low to moderate level of short-term adverse effects in localized areas, particularly from May through October. Low to moderate harvest of wildlife by people associated with mining and dredging activities is anticipated in localized areas of the Fortymile River watershed. The principal long-term adverse effect of mining in the Fortymile River watershed would be the unavoidable loss (even with reclamation) of approximately 690 acres of the upland riparian habitat in Wade Creek, Walker Fork, the vicinity of Chicken, and other areas for a 25 to 50 year period. In addition, approximately 405 acres of the physically altered areas would remain permanently barren or support only sparse vegetation after 25-50 years. The long-term cumulative loss of habitat to federal (243 acres) and State/private (162 acres) mining activities in these areas of the Fortymile River watershed would probably contribute to a low to moderate reduction in moose population potential.

The potential exists for long-term cumulative adverse effects to moose, caribou, raptors, furbearers, or other species if human use of the area increases greatly in crucial wildlife habitats (i.e., caribou calving, caribou movement routes, raptor nesting sites). Additionally, the potential exists for a greater long-term loss of crucial wildlife habitat from removal of vegetation due to an increase in mining activity. The long-term cumulative effects of potential future disturbance or disruption, and loss of crucial habitat could be significant depending on the specific location, timing, amount, and duration of the actions.

4.6.5 Alternative D

Access

Permanent gravel roads, excluding the Taylor Highway, would continue to result in the loss of 705 acres of wildlife habitat in the Fortymile River watershed if Alternative D is implemented. Permanent gravel roads directly associated with federal mineral development totaling 178 acres would remain in place. Those roads directly associated with State and private mineral development would total 527 acres, and those formerly associated with both federal and State and private mineral developments would be used for State and private operations only.

The continued use of 69.3 total miles of primitive roads and trails to access State and private mines would subject 44,854 acres of wildlife habitat to short-term periodic disturbance by vehicular traffic when moose, caribou, and other species are present. The use of primitive roads and trails in the Fortymile River watershed to access federal mineral developments would cease. The level of vehicular use on roads and trails (excluding the Taylor Highway) would be low to moderate due to an increase in recreation activities.

No alteration, disturbance, or disruption of wildlife movement routes, and seasonal use areas directly attributable to federal mining access is anticipated. The South Fork Fortymile River and mainstem Fortymile River between the South Fork bridge and O'Brien Creek bridge (39 river miles) would be the principal access route used by dredgers to access their camps and dredging sites. As a result, periodic disturbance from operation of motor boats would occur along the South Fork and mainstem Fortymile River (29,255 acres) from June through September.

Recreation and other use of trails and roads into Hutchinson Creek, Mount Warbelow, and other areas of the Fortymile River basin would continue to indirectly result in increased harvest of moose, caribou, grizzly bear, black bear, furbearers, and other species.

Facilities

Facilities associated with federal mining camps in the Fortymile River would be removed and the sites reclaimed. The presence of 17 State and private mining camp facilities and structures in the Fortymile River watershed would result in the long-term loss of 17 acres of upland riparian habitat. Facilities associated with 18 dredger campsites would total less than 18 acres. Less than 630 acres of riparian habitat used by moose and other species would be unavailable for the short term due to frequent human disturbance from May through October. Disturbance at federal mineral development sites would not occur, while State and private activities would comprise 306 acres of the total. Additional areas subject to disturbance at dredger campsites would total less than 324 acres. Grizzly or black bears could be removed as nuisance animals due to their attraction to food, refuse, or solid waste in the vicinity of State and private mining facilities and dredger campsites.

Operations

Past activities associated with stripping, mine cuts, stockpiles, and settling basins have resulted in physical alteration of about 1,661 total acres of upland riparian habitat in Wade Creek, Walker Fork, the vicinity of Chicken, and other areas. The habitat previously lost to mining operations was 1,270 acres and additional future habitat losses associated with State and private operations would total 391 acres. Reclamation of federal mining areas disturbed since 1981 would occur through leveling tailings and natural succession. Reclamation on State and private mining areas would consist of leveling tailings and natural succession. Revegetation in previously undisturbed federal mining areas (disturbed since 1981) would probably require 30-50 years, and revegetation in federal old tailing areas disturbed since 1981 would require at least 50 years (Figure 4-2) to reach a stage suitable for moose browse. Revegetation in previously undisturbed State/private mining areas would require 30-50 years, and revegetation in State/private old tailing areas would require at least 50 years (Figure 4-2), to reach a stage suitable for moose browse. Wildlife may avoid 26,606 acres of riparian and upland habitat during the summer mining season due to noise from machinery and other mining activities. Periodic disturbance by noise from federal mining would not occur. Disturbance from State and private mining will be 8,535 acres, and disturbance by noise from suction dredging (maximum 36 sites) would be 18,072 acres. Fuel spills from State and private mining and dredging activities may result in contamination or loss of wildlife habitat.

Conclusion

The effects of Alternative D are summarized in Figure 4-5. Approximately 2,383 total acres of upland riparian wildlife habitat (primarily moose winter range) would be physically altered due to mining related activities (including roads and facilities) in the Fortymile River watershed.

Periodic disturbances to wildlife due to use of roads and trails, operation of boats, vehicles, and machinery, and State and private mining and dredging-related human habitation in the Fortymile River watershed totaling 176,343 acres could result in a low to moderate level of short-term adverse effects in localized areas, particularly from May through October. Period disturbances from federal mines would cease. Low to moderate harvest of wildlife by people associated with recreation use of roads and trails, and State and private mining and dredging activities is anticipated in localized areas of the Fortymile River watershed. The principal long-term adverse effect of mining in the Fortymile River watershed would be the unavoidable loss (even with reclamation) of approximately 391 acres of the upland riparian habitat in Wade Creek, Walker Fork, the vicinity of Chicken, and other areas for a 40 to 50-year period. In addition, approximately 271 acres of the physically altered areas would remain permanently barren or support only sparse vegetation after 50 years. The long-term cumulative loss of habitat to past (1,331 acres) and additional State/private (271 acres) mining activities in these areas of the Fortymile River watershed would probably contribute to a low to moderate reduction in moose population potential.

The potential exists for long-term cumulative adverse effects to moose, caribou, raptors, furbearers, or other species if human use of the area increases greatly in crucial wildlife habitats (i.e., caribou calving, caribou movement routes, raptor nesting sites). Additionally, the potential exists for a greater long-term loss of crucial wildlife habitat from removal of vegetation due to a pos-

Action Component/ Potential Impact		Proposed Action	Alternative A	Alternative B	Alternative C	Alternative D
Permanent roads result in habitat loss	Extent	Federal: 94.4 miles/ 572 acres State/Private: 24.8 miles/ 150 acres Joint: 62.2 miles/ 377 acres Total: 181.4 miles/ 1,099 acres	75.2 miles/ 456 acres 21.6 miles/ 131 acres 54.1 miles/ 328 acres 150.9 miles/ 915 acres	75.2 miles/ 456 acres 21.6 miles/ 131 acres 54.1 miles/ 328 acres 150.9 miles/915 acres	63.0 miles/ 382 acres 18.1 miles/ 110 acres 45.4 miles/ 275 acres 126.8 miles/ 767 acres	29.4 miles/ 178 acres 87.0 miles/ 527 acres 0/0 116.4 miles/ 705 acres
	Duration	Mine life & beyond	Mine life & beyond	Mine life & beyond	Mine life & beyond	Mine life & beyond
	Frequency	Annually	Annually	Annually	Annually	Annually
Use of roads/trails can disrupt normal wildlife use patterns[2]	Extent	Federal: 135.1 miles/ 87,468 acres State/Private: 30.4 miles/ 20,460 acres Joint: 80.7 miles/ 52,652 acres Total: 246.2 miles/ 158,572 acres	110.6 miles/ 71,788 acres 26.5 miles/ 17,964 acres 70.1 miles/ 45,868 acres 207.2 miles/ 133,812 acres	110.6 miles/ 71,788 acres 26.5 miles/ 17,964 acres 70.1 miles/ 45,868 acres 207.2 miles/ 133,812 acres	92.7 miles/ 60,392 acres 22.1 miles/ 15,148 acres 58.9 miles/ 38,700 acres 173.8 miles/ 112,236 acres	74.6 miles/ 46,748 acres[1] 111.1 miles/ 72,108 acres 0/0 185.7 miles/ 119,852 acres
	Duration	6 months (May–Oct) All months for recreation use	6 months (May–Oct) All months for recreation	6 months (May–Oct) All months for recreation	6 months (May–Oct) All months for recreation	Federal: NO EFFECT[1] State/Private: 6 months (May–Oct) All months for recreation use
	Frequency	Intermittent	Intermittent	Intermittent	Intermittent	Intermittent
Use of river for access/ transportation by dredgers can disrupt normal wildlife use patterns	Extent	39 miles/29.255 acres	39 miles/29.255 acres	39 miles/29.255 acres	39 miles/29.255 acres	39 miles/29.255 acres
	Duration	4 months (June–Sept)	4 months (June–Sept)	4 months (June–Sept)	4 months (June–Sept)	4 months (June–Sept)
	Frequency	38 sites, intermittent, daily	30 sites, intermittent, daily	30 sites, intermittent, daily	20 sites, intermittent, daily	38 sites, intermittent, daily
Use of trails enhances access & increases harvest	Extent	Federal: 40.7 miles/ 26,550 acres State/Private: 5.6 miles/ 4,086 acres Joint: 18.5 miles/ 2,942 acres Total: 64.8 miles/ 41,974 acres	35.4 miles/ 48,690 acres 4.9 miles/ 14,328 acres 18 miles/ 35,126 acres 58.3 miles/ 97,078 acres	35.4 miles/ 48,690 acres 4.9 miles/ 14,328 acres 18 miles/ 35,126 acres 58.3 miles/ 97,078 acres	29.7 miles/ 19,510 acres 4.0 miles/ 3,062 acres 13.5 miles/ 8,142 acres 47.2 miles/ 30,716 acres	45.2 miles/ 29,430 acres[1] 24.1 miles/ 15,926 acres 0/0 69.3 miles/ 44,854 acres
	Duration	Mine life & beyond	Mine life & beyond	Mine life & beyond	Mine life & beyond	Present, & beyond
	Frequency	Annually	Annually	Annually	Annually	Annually
Potential upgrading of roads/ trails & more roads/ trails can increase habitat loss, disturbance, & harvest	Extent	Federal: Unpredictable, but greater State/Private: Unpredictable, but greater	Unpredictable, but greater Unpredictable, but greater	Unpredictable, but greater Unpredictable, but greater	Unpredictable, but greater Unpredictable, but greater	NO EFFECT[1] Unpredictable, but greater
	Duration	Mine life & beyond All months for recreation use	Mine life & beyond All months for recreation	Mine life & beyond All months for recreation	Mine life & beyond All months for recreation	Federal: NO EFFECT[1] State/Private: Mine life & beyond, all months for recreation use
	Frequency	Annually	Annually	Annually	Annually	Annually
Gravel pads etc. remove/ cover habitat	Extent	Federal: 23 acres State/Private: 17 acres Total: 40 acres	20 acres 15 acres 35 acres	20 acres 15 acres 35 acres	18 acres 12 acres 30 acres	30 acres[4] 17 acres 17 acres
	Duration	Mine life plus 30–50 years	Mine life plus 30–50 years	Mine life plus 30–50 years	Mine life plus 25–50 years	Federal: 30–50 years[4] State/Private: Mine life plus 30–50 years
	Frequency	Annually	Annually	Annually	Annually	Annually

continuation

Action Component/ Potential Impact		Proposed Action	Alternative A	Alternative B	Alternative C	Alternative D
Human habitation can cause disturbance/ disruption	Extent	Federal: 414 acres	360 acres	360 acres	324 acres	NO EFFECT
		State/Private: 306 acres	270 acres	270 acres	216 acres	306 acres
		Dredger camps: 16 sites/324 acres	15 sites/270 acres	15 sites/270 acres	10 sites/160 acres	16 sites/324 acres
		Total: ess than 1,044 acres	Less than 900 acres	Less than 900 acres	Less than 720 acres	Less than 630 acres
	Duration	Mines: 6 months (May–Oct)	6 months (May–Oct)	6 months (May–Oct)	6 months (May–Oct)	Federal: NO EFFECT State/Private: 6 months (May–Oct)
		Dredgers: 4 months (June–Sept)	4 months (June–Sept)	4 months (June–Sept)	4 months (June–Sept)	Dredgers: 4 months (June–Sept)
	Frequency	Annually during mine life	Annually during mine life	Annually during mine life	Annually during mine life	Annually during mine life
Improper solid waste disposal and food storage may attract nuisance animals	Extent	Federal: 1–3 bears	1–3 bears	1–3 bears	1–3 bears	NO EFFECT
		State/Private: 1–3 bears	1–3 bears	1–3 bears	1–3 bears	1–3 bears
		Dredgers: 1–3 bears	1–3 bears	1–3 bears	1–3 bears	1–3 bears
	Duration	Mines: 6 months (May–Oct)	6 months (May–Oct)	6 months (May–Oct)	6 months (May–Oct)	Federal mines: NO EFFECT State/Private mines: 6 months (May–Oct)
		Dredgers: 4 months (June–Sept)	4 months (June–Sept)	4 months (June–Sept)	4 months (June–Sept)	Dredgers: 4 months (June–Sept)
	Frequency	Annually	Annually	Annually	Annually	Annually
Stripping, mine cuts, stockpiles & ponds remove/ cover habitat	Extent	Federal: 529 acres	460 acres	460 acres	414 acres	NO EFFECT[4]
		State/Private: 391 acres	345 acres	345 acres	276 acres	391 acres
		Total: 2,180 acres[3]	2,075 acres[3]	2,075 acres[3]	1,960 acres[3]	1,661 acres[3]
	Duration	Federal: 25–30 years	30–50 years	30–50 years	25–50 years	30–50 years[4]
		State/Private: 30–50 years	30–50 years	30–50 years	30–50 years	30–50 years
	Frequency	Annually	Annually	Annually	Annually	Annually
Operation of machinery can disrupt normal wildlife use patterns	Extent	Federal: 11,546 acres	10,061 acres	10,061 acres	9,107 acres	NO EFFECT
		State/Private: 8,534 acres	7,530 acres	7,530 acres	6,024 acres	8,534 acres
		Dredging sites: 38 sites/18,072 acres	30 sites/15,060 acres	30 sites/15,060 acres	20 sites/10,040 acres	38 sites/18,072 acres
		Total: 37,152 acres	40,161 acres	40,161 acres	25,121 acres	26,606 acres
	Duration	Mines: 6 months (May–Oct)	6 months (May–Oct)	6 months (May–Oct)	6 months (May–Oct)	Federal mines: NO EFFECT State/Private mines: 6 months (May–Oct)
		Dredgers: 4 months (June–Sept)	4 months (June–Sept)	4 months (June–Sept)	4 months (June–Sept)	Dredgers: 4 months (June–Sept)
	Frequency	Annually	Annually	Annually	Annually	Annually
Hazardous material spills result in habitat loss	Extent	Federal: Unpredictable	Unpredictable	Unpredictable	Unpredictable	NO EFFECT
		State/Private: Unpredictable	Unpredictable	Unpredictable	Unpredictable	Unpredictable
		Dredgers: Unpredictable	Unpredictable	Unpredictable	Unpredictable	Unpredictable
	Duration	Federal: 30–50 years	30–50 years	30–50 years	25–50 years	NO EFFECT
		State/Private: 30–50 years	30–50 years	30–50 years	30–50 years	30–50 years
	Frequency	Unpredictable	Unpredictable	Unpredictable	Unpredictable	Unpredictable

[1] Due to State/Private mineral development, recreation or other uses; none directly attributable to Federal mineral development.
[2] Maximum total area subjected to disturbance by use of roads/trails when/if wildlife are present.
[3] Includes pre – 1981 disturbance acreage.
[4] Reclamation will be conducted on previously disturbed areas with minimum available fines.

Figure 4–5. Summary and comparison of probable effects on wildlife resources in relation to the proposed action and alternatives.

sible increase in State and private mining and dredging activity. The long-term cumulative effects of potential future State and private mining and dredging disturbance or disruption, and loss of crucial habitat, could be significant depending on the specific location, timing, amount, and duration of the State and private mineral development and dredging activities.

4.6.6 Special Considerations

Cumulative Impacts

Cumulative impacts to wildlife populations are primarily associated with habitat loss from past, current, and projected mining activity. Much of the past impact comes from loss of riparian vegetation in historically mined areas which have not been reclaimed, or from acreage used for roads. In the mined tributaries of the Fortymile River, 890 of 1,050 acres disturbed remain barren or sparsely vegetated 40-80 years after mining. The mining activity of 1987 is estimated to result in 190 acres of barren or sparsely vegetated land.

Under the Proposed Action, a total of 2,530 acres would remain barren or sparsely vegetated after a regrowth period of 25 to 30 years. Alternative A would result in 2,450 acres barren after 50 years; under Alternative B, 2,365 acres would remain barren after 30 to 50 years; under Alternative C, 2,065 acres would remain barren after 25 to 30 years; and under Alternative D, 1,870 acres of historic and non-federal surface disturbance would remain barren or sparsely vegetated.

Unavoidable Adverse Impacts

Species that are sensitive to noise, odors, movement, and the presence of human activity are most affected by mining and dredging activities and will avoid areas where these actions occur. Construction and use of facilities, operation of mining and dredging equipment, and increased boat or vehicular traffic for access result in an unavoidable adverse effect to wildlife. Mining roads and trails are generally not removed or closed to public use. This situation facilitates an increase in human use of wildlife and other resources over the long term. Over the long term, the extent, frequency, and duration of the activities determine the degree of disturbance or disruption.

Natural recovery of wildlife habitat is slow in areas that have been disturbed by mineral development. Reclamation practices can enhance the recovery of wildlife habitat in disturbed areas; nevertheless, the affected habitat may be lost for 25 to 50 years. The principal habitats that are unavoidably lost over the long term are the riparian habitats that can be especially important to moose as winter range. Furthermore, previously-mined areas that are subjected to additional mining are the principal source of permanent habitat loss because fines and other basic soil components are not available for use in reclamation. It is possible for localized extirpation or reduction beyond minimum viable population levels to occur if the overall extent of habitat loss is large and the duration is long term.

The potential exists for an overall increase in the level of cumulative impacts on wildlife and habitat. This could occur because of the accumulation of small, apparently insignificant, residual

impacts to wildlife resources over time. This unavoidable impact could become substantial over the long-term if conflicts between wildlife values, mineral development, increased visitor use, and a greater demand for human use of the wildlife resource are not adequately mitigated.

Short-Term Uses vs Long-Term Productivity

The long-term productivity of wildlife habitat subject to mineral development activities would depend on: 1) the extent and timing of mineral development activities, 2) the success of mitigative measures or management controls to minimize the alteration and disturbance of normal wildlife use patterns, and 3) the successful reclamation of habitat that has been physically altered, removed, or lost.

Short-term use of certain sites for mining may ultimately result in long term changes in vegetation composition and increased productivity of the site for some species. For example, sites underlain by permafrost with black spruce and few willows present are relatively unproductive as moose winter range. Over the long term, mining and reclamation of the site may ultimately result in an increase of willows available for moose as winter browse.

Even the successful implementation of management controls to avoid, minimize, or replace lost habitat cannot prevent the possibility of a reduction in the long-term opportunity for increasing the potential moose population. The area has supported a larger population of moose in the past and the existing habitat has the potential to support a larger population (the present moose population is not at carrying capacity). The loss of existing moose habitat, especially late winter range, due to mineral development activities could reduce carrying capacity. The potential for optimal numbers of moose would be lowered because the habitat carrying capacity would have been reduced due to mineral development. The degree of impact to the moose population potential in the region would depend on the overall extent and duration of the habitat loss.

Irreversible and Irretrievable Commitments of Resources

Wildlife and habitat are renewable resources over the long-term. If the mitigative measures designed to avoid, minimize, and monitor the adverse effects and to replace habitat physically altered by mineral development were fully and successfully employed, there would be little irreversible or irretrievable commitment or permanent loss of wildlife habitat over the long-term. Previously-mined areas that are subjected to additional new mining are the principal source of permanent habitat loss because fines and other basic soil components are not available for use in reclamation.

4.6.7 Threatened and Endangered Wildlife

Impacts Common to All Alternatives

The Proposed Action and alternatives are anticipated to have no effect on the endangered peregrine falcon. Each operator is required to take such action as may be needed to prevent adverse impacts to threatened or endangered species, 43 CFR 3809.2-2(d).

The degree of impact on nesting activities and productivity of the peregrine falcon depends on the location, timing, extent, and frequency of disturbance.

Protective Measures

Each proposal to conduct mining activities on public lands is evaluated by BLM on a case-by-case basis for potential conflicts with the peregrine falcon and its habitat. As a result, the recommended protective measures of the Peregrine Falcon Recovery Plan (USFWS 1982), and formal or informal consultation with the U.S. Fish & Wildlife Service (USFWS), may be employed by BLM, if necessary. The standard mitigation or protective measures recommended by the USFWS are:

Within one mile of nest sites:

1. Require aircraft to maintain minimum altitudes of 1500 feet above nest level from April 15 through August 31.

2. Prohibit all ground level activity from April 15 through August 31, except on existing thoroughfares.

3. Prohibit habitat alterations or the construction of permanent facilities.

Within two miles of nest sites:

1. Prohibit activities having high noise levels from April 15 through August 31.

2. Prohibit permanent facilities having high noise levels, sustained human activity, or which alter limited, high-quality habitat (e.g., ponds, lakes, wetlands, and riparian habitats).

Within 15 miles of nest sites:

1. Prohibit alteration of limited, high quality habitat which could detrimentally and significantly reduce prey availability. Of particular concern are ponds, lakes, wetlands, and riparian habitats.

2. Prohibit use of pesticides. The only exception may be limited non-aerial application of approved non-persistent insecticides at supply bases.

Additional Mitigation Measures

1) Limit or control the type of use, frequency, location, and noise from motorized equipment in critical habitat areas.

2) Direct the use of boats, dredges, and campsites clear of critical wildlife use areas (raptor nest habitat) to minimize disturbance.

3) Limit or control number of people within the critical habitat to minimize disturbance.

4) Identify acceptable camp locations and locate at least one mile from nesting habitat to avoid disturbance.

5) Maintain coordination with USFWS.

6) Continue monitoring nesting habitat and use, as well as potential conflicts with motorized boats, dredges, and campsites.

Unavoidable Adverse Impacts

No unavoidable adverse impacts are anticipated to result from implementation of the Proposed Action or the alternatives.

Short-Term Uses vs Long-Term Productivity

No adverse impact to the long-term productivity of the peregrine falcon is anticipated to result from implementation of the Proposed Action or the alternatives.

Irreversible and Irretrievable Commitments of Resources

No irreversible or irretrievable commitment or permanent loss of peregrine falcon habitat is anticipated to result from implementation of the Proposed Action or the alternatives.

4.7 Fisheries

Placer mining affects aquatic systems directly through habitat disruption or physical alteration, and indirectly through point and non-point discharges of waste waters (Figure 4-6). Direct impacts to the aquatic community include the destruction of instream habitat, disruption of riparian zones, and creation of migration barriers. Indirect impacts to the aquatic community result from increased levels of trace metal contaminants, increased turbidity and suspended sediment, increased levels of settleable solids, increased imbeddedness of stream substrates, decreased food supply for fish, long-term changes in channel configuration, and long-term disruption of riparian habitats. The overall severity of these effects on aquatic communities depends on the magnitude, frequency, and duration of placer mining.

Effects on Aquatic Habitats

Numerous studies have addressed the effects of placer mining on chemical water quality of affected streams. Many of these studies have identified alterations in chemical components. In some cases, levels of trace metals like arsenic, cadmium, copper, lead, mercury, and zinc exceeded drinking water and aquatic life protection standards. Dames and Moore et al. (ADEC 1986) provide a summary discussion of these data. The general conclusion by all studies is that concentrations of certain trace metals were increased downstream of mining activity and may pose a threat to aquatic animals if a significant portion of the total recoverable metals dissolve and are biologically available. There is a positive relationship between total recoverable and dis-

solved fractions of the metals. Therefore, it follows that reductions in sediment inputs from mining could substantially reduce metals concentrations in the affected streams (ADEC 1986, LaPerriere et al. 1985).

	DIRECT EFFECTS	INDIRECT EFFECTS
Actions which physically alter the Aquatic Habitat	Loss of Instream Habitat	Straight\monotypic stream channel Increased water velocity Decreased pools
	Loss of Streamside (Riparian) Habitat	Unstable banks Decreased temperature control Decreased detrital nutrient input Decreased debris recruitment
	Creation of Migration Barriers	Decrease in suitable habitat
Discharge of Wastewater	Increased Suspended Sediment/Turbidity	Increased trace metals Decreased light penetration, which leads to decreased primary production Decreased incubation and rearing suitability for fish Decreased incubation and rearing suitability for aquatic insects Interference with fish migration, which leads to decreased available habitat Decreased opportunity for recreational fishing
	Increased Settleable Solids/Sediment	Decreased aquatic insect density, biomass, diversity which leads to decreased fish food supply Increased stream substrate imbeddedness Increased smothering of incubating eggs

Figure 4-6. Direct and indirect effects of physically altering the aquatic habitat and the discharging of wastewater.

The biological significance of this conclusion is complicated by several factors. The sensitivities of arctic grayling and other organisms are not well known, the speciation of some of the metals is not known, the degree of tolerance of the local organisms is unquantified, and the proportion of metals that is biologically available versus that which is totally recoverable is unknown. All of these uncertainties contribute to the difficulty of assessing the biological significance of these data.

Increases in total suspended solids (TSS) and turbidity levels in streams with placer mining and in receiving waters downstream are the most significant impacts of mining activity. Many studies document increases in suspended sediment concentrations of several orders of magnitude over background levels as a result of placer mining. The degree or magnitude of increase is highly

variable and is a function of regional geology, type of mining operation, and effectiveness of waste water treatment.

Placer mining affects the physical habitat in a stream through destruction of the channel, and removal of the organic overburden of the banks and riparian zone adjacent to the stream. The post-mining stream channel is usually straight and the stream usually flows along bedrock with no pools or meanders, resulting in a higher gradient with high water velocity, potentially affecting adequate fish passage.

The disruption of riparian habitat along the stream is a major impact from placer mining. Riparian habitat is important for bank stabilization, detrital nutrient input, temperature control, and debris recruitment. Weber and Post (1985) reported mined areas over 60 years old where riparian vegetation covered only 25% of the banks. As with reestablishment of the channel morphology, the regeneration of the riparian vegetation requires long periods in the subarctic environment. These processes can be expected to take over 100 years on unreclaimed streams. These impacts of placer mining on the aquatic system are typically long-term, and may remain even with reclamation measures.

Effects on Aquatic Populations

Light penetration is crucial to primary production in aquatic ecosystems. Turbid conditions that reduce light penetration will reduce primary productivity. In turn, reductions in primary productivity are transmitted up the food chain and can ultimately result in reduced populations of fish and their prey.

The general lack of forest or canopy cover over some subarctic streams suggests that these streams may be highly dependent on instream productivity to support fish and other aquatic animals. Reductions in primary productivity could lead to reductions in biomass of aquatic invertebrates and ultimately to reductions in fish biomass, especially in the higher elevation headwater areas. Destruction of the riparian vegetation along forested streams also reduces carbon inputs from leaf litter.

Sediment and/or turbidity adversely affects aquatic invertebrate density, biomass, and diversity. Studies demonstrate that increasing suspended and deposited sediments can lead to smothering and reduced respiratory efficiency of aquatic insects, abrasion, interference with filter feeders and net spinners, reduced food resources for grazers, cementing or increases in imbeddedness, and filling of crevices among larger cobbles. All of these actions result in habitat alterations that make the stream unsuitable for many species of aquatic organisms.

Weber and Post (1985) made comparisons of invertebrate populations above and below mining activity and compared unmined versus previously mined streams. In all cases, average densities of invertebrates decreased at sites below mining activity when compared to upstream populations. In many cases, whole families and one entire order (*Trichoptera*, caddis flies) disappeared below mining. In streams which had experienced previous mining activity, invertebrate densities were

about 37% lower than unmined streams. In streams below active mining, invertebrate densities were reduced by nearly 90% compared with segments upstream of mining activity.

The effects of reduced food supply and therefore reduced fat storage on overwinter survival and long-term fitness, may be an important effect of placer mining on fish populations. Even if grayling were able to survive the summer in water heavily loaded with suspended solids it is possible that they would be unable to store the same fat reserves accumulated by fish in clearwater areas. Therefore, they could be adversely affected in their overwinter survival, hampered in their upstream migration to spawning areas in the spring, and could be less able to successfully reproduce. Overall, this could lead to a lower reproductive fitness of these fish populations and to their possible elimination over time.

Numerous studies have been conducted to assess the effects of fine sediments on fish populations. Direct effects of suspended solids on fish begin to be observed somewhere in the range of 50 to 100 mg/l (Herbert and Merkens 1961; EIFAC 1965; Noggle 1978; Berg 1982; McLeay et al. 1983, 1984; Simmons 1984; Lloyd 1985; Chapman and McLeod 1987; McLeay et al. 1987). EIFAC (1965) determined that suspended solids had not demonstrated adverse effects on fish at or below 25 mg/l. They further concluded that good to moderate fisheries could be expected with suspended sediment concentrations between 20 and 80 mg/l. At concentrations above 80 mg/l it was considered unlikely that good fisheries could be maintained, and at about 400 mg/l, only poor fisheries could be expected.

McLeay et al. (1983, 1984, 1987) conducted an extensive series of experiments concerning the effects of suspended solids from placer mining on arctic grayling. They found lethal and sublethal effects from acute exposure at concentrations of 50,000 to 250,000 mg/l and chronic exposure up to 1,000 mg/l. Chronic exposures for six weeks to concentrations greater than 100 mg/l impaired feeding, caused reductions in growth rates, showed changes in coloration, and caused downstream displacement of experimental fish. Stress, as measured by changes in blood chemistry, was reported in fish exposed for short periods to suspended solid concentrations as low as 50 mg/l. It was noted that downstream displacement and the resultant decrease in suitable habitat were of particular concern in maintaining healthy fish populations in streams exposed to placer mining.

Bjerklie and LaPerriere (1985) documented reduced hydraulic connection between surface and subsurface waters as an indirect effect of sediment on groundwater. The result of increased sediment in these circumstances is a lowering of the groundwater below the stream and a significant reduction in dissolved oxygen in mined streams. This condition could result in a reduction in overall quantity and quality of overwintering habitat and has been known to be directly harmful to fish eggs and aquatic insect larvae present in the substrate materials.

Based on the total suspended sediment data reported by Mack et al. (1987) no past or present conditions have been identified within this basin which would be expected to significantly affect grayling or other fish populations. Recent benthic invertebrate data (Maurer 1987), which are contrary to data found by Dames & Moore (1983), suggest that invertebrate densities are greater than or equal to those found in undisturbed streams elsewhere in Interior Alaska. The limited and

sometimes conflicting data available on invertebrate and fish populations are not sufficient to determine if impacts of placer mining have been significant in the Fortymile River basin.

In two studies (Weber and Post 1985, ADEC 1986), fish were found in clear water tributaries of mined streams below active mining, and in unmined streams, but none were found in clearwater tributaries upstream of active mining. Mathers et al. (1981) found adult grayling in almost all streams sampled, but no juvenile fish were found in three streams heavily affected by mining. Mathers et al. found adult grayling in suspended solids concentrations as high as 4,453 mg/l. However, they were unable to determine if these fish were residing in these conditions or were moving downstream to escape the high suspended sediment loads. In one stream with suspended solid concentrations over 7,000 mg/l no grayling were found. Sediment impacts to incubating eggs may have been the cause for the absence of grayling fry in three streams sampled by Mathers et al. Grayling broadcast their eggs over gravel or other substrates, making no effort to produce a redd as is common with trout and salmon (Reed 1964). Eggs exposed on the surface of the substrate are susceptible to smothering by sediment deposition from mining activities.

Physical disturbance of stream channels may be another factor that affects grayling distribution (ADEC 1986). Data suggest that long reaches of disturbed channels with potential passage barriers restrict migration into some clearwater tributaries and therefore affect access to available habitat in some river basins. This could reduce the ability of a basin affected by mining to support a grayling population.

4.7.1 Proposed Action

On federal claims, the reclamation standards would result in fairly rapid regrowth of the riparian vegetation (25-30 years), and reduce the amount of non-point sedimentation over the long term. The standards require restoration of the diverted stream reaches in the original floodplain to approximate premining characteristics, i.e., configuration, flow velocity, and hydraulic gradient. This restoration and replacement of habitat would minimize the long-term impacts to fish habitat. Remining old dredged tailings may result in enhanced fish habitat after reclamation of the previously used stream bypass.

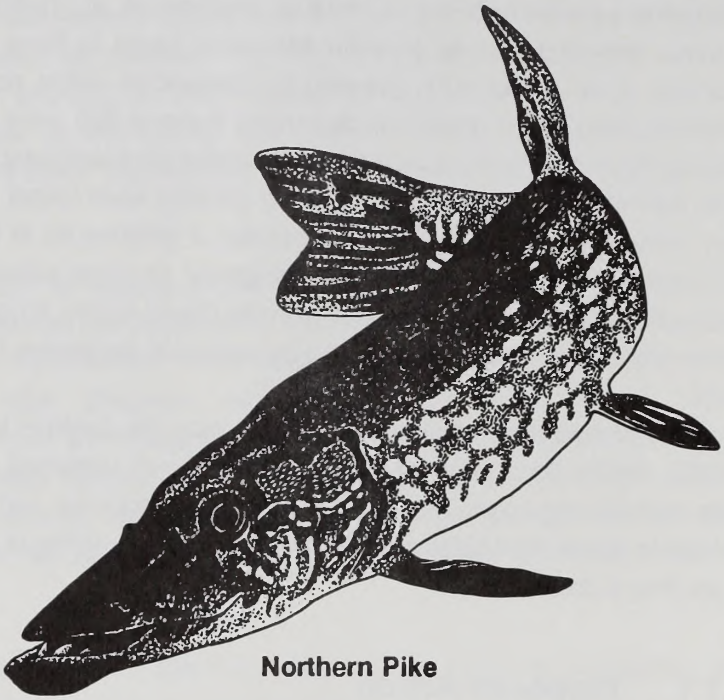
Because reclamation standards for State and private mines do not require restoration of fish habitat, the direct effects of these mining operations would be habitat degradation due to physical alteration of the stream channel. Streams in excavated areas develop new channels through the tailings and over exposed bedrock. These channels are usually shallow with few pools, have little instream cover, are unstable during breakup, and are generally poor habitat for fish and aquatic insects. These areas may also reduce the availability of habitat in upstream areas. The physical alteration on mine sites would also result in the loss of riparian vegetation which, under normal conditions, provides bank stability, instream cover, temperature control, and detrital nutrient input.

It is expected that if water quality standards are met, concentrations of arsenic, copper, lead, mercury, or other trace metals would not change significantly in areas downstream of mining activities, as discussed in Section 4.4. Although levels should not exceed State standards, the

biological significance of any increase in metals concentrations is unknown. The magnitude of the increase would depend on the geology at mine sites, the type of mining operation, and the effectiveness of wastewater treatment. Mining operations would increase the total suspended solids downstream. The magnitude of impacts from increased suspended sediment and turbidity would depend on the geology at the mine site and the effectiveness of wastewater treatment.

Mining activities would reduce primary productivity in areas affected by increased suspended sediment and turbidity. The magnitude of this reduction would depend on the geology at the mine sites and the effectiveness of wastewater treatment.

The average density or abundance and diversity of aquatic insects would be decreased downstream of mining activities. The magnitude of this change would depend on total suspended solid concentrations. These concentrations, in turn, depend on geology at the mine sites and the effectiveness of wastewater treatment.



Northern Pike

The combined effect of the mining operations would at least partially eliminate grayling from the mined reaches of the stream. However, clearwater tributaries and other areas in the basin would continue to support all age classes and sizes, including fry, of grayling and other species. The overall magnitude of effects to fish populations is not possible to determine. Habitat suitability in the streams affected by mining would decrease due to increased toxic metals concentrations, reduced food supply, reduced cover and refuge habitat, and reduced visibility for feeding. The magnitude of the impacts to fish populations would probably be a function of water gradient, velocity, depth, sediment concentrations, and the extent of rearing habitat lost. These impacts would exist for the short-term on federal claim, but would persist over the long-term at State and private mines. Spawning habitat in unaffected streams could be expected to provide and maintain some recruitment for the affected areas if the habitat is suitable for rearing.

Several suction dredging operators have observed opportunistic feeding by fish that congregate and feed on dredge displaced benthic invertebrates during dredging activities.

Fish and benthic invertebrate habitat is disturbed, but not directly eliminated where suction dredging occurs on navigable segments of the Fortymile River drainage. Disturbance of instream habitat through suction dredging in 1987 was estimated to be seven acres of the estimated total

navigable riverbed of 2,806 acres. Fish migration routes are not blocked as a result of suction dredging activities.

Suction dredging of fish eggs before or during the emergence period is unlikely as most suction dredging operations are conducted after emergence of the fry. Entrainment of fry through suction dredge mining is possible and would increase the mortality rate. Suction dredging may improve habitat for fish eggs and benthos through churning up embedded material, although the process is slow and the resuspended sediment released may offset the benefits by adding to downstream sedimentation and embeddedness (Hassler 1986). Hassler (1986) showed that suction dredging of California streams changed the local species composition but did not reduce the abundance of aquatic invertebrates. Suction dredging causes significant short-term localized alterations of benthic invertebrate communities and adversely affects the abundance and diversity of benthos where the riverbed has been worked. Recolonization is primarily through drift into dredged areas within one to three months and total recolonization trends of mined areas vary with invertebrate type (Hassler 1986).

Conclusions

Physical alteration of streams and minimal increases in suspended sediments from mines would result in an unknown magnitude of impact on population levels of aquatic resources. Approximately 46 miles (26 federal, 20 State/private) of physical disturbance to streams would occur. Fish passage would be provided as required by the ADF&G and would minimize the potential reduction in availability of habitat in upstream areas. Some of the projected mining activity would probably be in areas previously dredged. On federal claims, reclamation of disturbed stream reaches may improve physically altered fish habitat in these areas over the long term. The magnitude of the overall cumulative effect of total suspended solids increases in the Fortymile River cannot be determined since these effects depend on the geology at individual mine sites.

The overall duration of effects on aquatic resources would depend on the magnitude of habitat disruptions, applicable reclamation standards, the recovery of physical habitat, and recolonization by fish and aquatic insects. Aquatic invertebrate populations exhibit rapid recolonization because most of these organisms use an aerial adult stage (fly) for dispersion and propagation if there is suitable instream and streamside habitat present. Restoration of the river/stream channel to approximate natural conditions is the situation most suitable for recovery and recolonization of aquatic resources.

4.7.2 Alternative A

Effects on fish habitat due to water quality changes would be about the same as for the Proposed Action. Impacts could be less because there would be no EPA variances as allowed under the Proposed Action. Some detectable increase in the sediment load and turbidity of the mined streams would result during the production phase of the operations; however, this increase and accumulation of sediment would not be detectable in the fish habitat downstream because of the

amount of dilution and large amounts of sediment transported during spring breakup. Regrowth of the riparian vegetation would require 30-50 years.

Cumulative impacts would be similar to those outlined for the Proposed Action and there would be no significant impacts on the Fortymile River fishery anticipated under Alternative A. Approximately 41 total miles (23 federal, 18 State/private) of streams would be disturbed under this alternative.

Some areas may be remined, and reclamation requiring stabilization of the stream bypass may enhance previously disturbed fish habitat. In areas of mining in previously unmined streambed, the stream would be channeled into a bypass. This would reduce fish habitat as bypasses are generally straight, with no pools, and with a faster velocity than the original stream channel.

4.7.3 Alternative B

Impacts from Alternative B would be similar to those listed under Alternative A. Compared to Alternative A the enhanced reclamation standards required for federal claims under Alternative B would probably increase the rate and amount of revegetation along the riparian zone. This would decrease the sedimentation from non-point erosion, and increase the bank stability, instream cover, temperature control, and detrital nutrient input. Reclamation standards, and therefore impacts, of State and private mines would be identical to Alternative A.

4.7.4 Alternative C

Impacts from mining under Alternative C would be less than those described in Alternatives A and B, due to minimum input of sediment and turbid process water into the stream and fewer projected operating mines. The reclamation standards would result in more rapid regrowth of the riparian vegetation (25-30 years), and the amount of non-point source sedimentation would be reduced. The standards in this alternative require rebuilding the stream channel in the original floodplain with pools, riffles, boulders, and approximately the original gradient. This restoration and replacement of habitat could minimize the long-term impacts to fish habitat. The remining of old dredge tailings would provide an opportunity to enhance fish habitat after reclamation of the present stream bypasses. Overall, there would be approximately 35 total miles (21 federal, 14 State/private) of physical disturbance to streams under this alternative.

4.7.5 Alternative D

Impacts to fish and invertebrate populations from sediment loading would be slightly less than the Proposed Action. The principal stream directly affected by the State/private operations would be the South Fork of the Fortymile River. Approximately 20 miles on 20 State/private operations of streams would be mined under this alternative. Some fish habitat may be degraded or lost without the requirement for restoration of mined stream reaches. The magnitude of the effects attributable to State/private mining would depending on the geology at individual mine sites and effectiveness

of wastewater treatment. Regrowth of the riparian vegetation would require 30-50 years in unreclaimed federal mine areas which would be stabilized and allowed to revegetate naturally.

4.7.6 Special Considerations

Cumulative Impacts

Total cumulative impacts to fisheries resources consist of past and current impacts in addition to those impacts discussed under each individual alternative. Impacts to fisheries are long-term impacts of habitat degradation through physical alteration of the stream channel, and short and long term impacts from changes in water quality. Historic mining has disturbed approximately 85 miles of the streambed of the Fortymile River and tributaries. The mining activity of 1987 disturbed an estimated 4.75 miles of stream, some of it in this area of previously disturbed floodplain. Portions of the Fortymile River and tributaries which have been physically altered by dozers, sluices, or dredges are generally characterized as straight, shallow, and high velocity with frequently split stream channels, unstable banks, and minimal streamside vegetative cover.

Future mining in previously mined areas may result in reclamation of portions of the stream channel under the Proposed Action and Alternative C. Quantitative cumulative effects on fish populations are difficult to assess due to lack of data on historic fish populations and other parameters. Relative cumulative impacts of the alternatives, in ascending order of impact (miles of fish habitat degradation and stream bank stability) are: Alternative C, Proposed Action, Alternative D, Alternative B, and Alternative A.

Unavoidable Adverse Impacts

The total concentration of certain trace metals would increase below mining activity. Increases in total suspended sediment levels would occur in streams with placer mining and in downstream waters. Physical alteration of streamside and instream habitat unavoidably results in long-term adverse effects. Turbid conditions would reduce light penetration and would reduce primary productivity. Increases in sediment/turbidity would also result in unavoidable adverse effects to aquatic insect density, diversity, and biomass. This in turn would result in reduced food supply for fish in affected streams. Placer mining may affect the distribution of fish in streams affected by mining if high suspended sediment concentrations are present.

Failure of water control structures, and runoff from access road construction creates sediment and may result in discharge into aquatic habitat. Introduction of sediment into the stream environment will occur during spring breakup and floods. Adherence to performance standards and mitigation measures would help alleviate the short-term impacts to water quality.

The magnitude of unavoidable adverse effects on aquatic resources depends on geology at the mine sites, type and duration of the operations, success of wastewater treatment, and reclamation of disturbed areas.

Short-Term Uses vs Long-Term Productivity

The long-term productivity of fish habitat would depend on the extent and timing of the mining development, and the success of reclamation efforts where the habitat has been physically altered. The short-term use by mining that affects the long-term productivity of aquatic resources results in losses of desirable instream and streamside habitat, degradation of water quality, channel changes, increased channel gradients, and sedimentation of stream substrate.

Irreversible and Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitments of the fishery resources if mitigation measures are followed and performance standards are met.

4.8 Cultural Resources

4.8.1 Proposed Action

Under the Proposed Action all federal Notice and Plan operations would be reviewed by a cultural resources specialist. A Class I Inventory would be done; this consists of a check of literature sources and the Alaska Heritage Resources Survey (AHRS) files maintained by the Alaska State Historic Preservation Officer's (SHPO) office. This constitutes an "appropriate level inventory" under 43 CFR 3809. At the end of the season, a compilation of all inventories on actions would be submitted to the SHPO's office as part of a Memorandum of Understanding between BLM-Alaska and the SHPO. A paragraph describing the operator's responsibility for cultural resources would be included in both Notice and Plan letters mailed to the operators. Information on known prehistoric, paleontological, or historic resources in the area and cultural resources potential would be included in the case file. Most cabins and other old mining structures and equipment are privately owned, part of the surface estate, or are not significant cultural resources. These would be generally noted or documented during on-site compliance inspections, along with references to identified paleontological or prehistoric materials.

Direct impacts would be the destruction of sites, structures, or materials. Indirect impacts would result from the increased accessibility of the area and the potential for damage to sites, structures, and materials from ORV's, hikers, and collectors.

To date, no cultural resources requiring preservation or mitigation have been found in this drainage; therefore, the potential conflict between 36 CFR 800 and 43 CFR 3809 has not been raised. This conflict involves BLM's obligation under 43 CFR 3809.2-2(e)(2) to take actions to salvage or otherwise mitigate impacts to cultural or paleontological resources within 10 working days after the operator notifies the Authorized Officer about the discovery. Following the 10 days the operator is allowed to resume mining. Yet under 36 CFR 800, if archaeological discoveries were found to be eligible to the National Register of Historic Places, a formal consultation process is triggered involving BLM, the Alaska State Historic Preservation Officer and the Advisory Council

on Historic Preservation, with the process specified to run well beyond 10 days (frequently 30-60 days or more).

4.8.2 Alternative A

Assessment and examination for cultural resources would be conducted for Alternative A in the same way as for the Proposed Action. It is unlikely that any change in impacts to cultural resources would result. As procedures would be the same for cultural resources under the different alternatives, the difference in impacts would be addressed in site-specific environmental analyses and in frequency of monitoring. This is compatible with the goals of the Fortymile River National Wild and Scenic River Management Plan.

4.8.3 Alternative B

Same as Alternative A.

4.8.4 Alternative C

Same as Alternative A.

4.8.5 Alternative D

There would probably be little further impact to cultural resources because mining would cease on federal lands. It is unlikely that State and private mining would cause any change in the impacts to cultural resources. Previously undisturbed prehistoric sites and paleontological resources would remain unexposed, undamaged, and undiscovered. Historic mining sites, which are generally not protected by federal legislation if under 50 years old, would remain largely intact although many old cabins, which are seasonally used and maintained by the miners, would be abandoned and subject to more rapid decay. Continuous natural erosion of drainages may damage and expose cultural and paleontological resources.

4.8.6 Special Considerations

Cumulative Impacts

Cumulative impacts of placer mining activity on cultural resources are difficult to evaluate. Inventories of cultural resources have located only a few sites in the Fortymile drainage. Historic mining activity has already disturbed most of the ground which has potential for cultural resources. Under all alternatives, further damage to both historic and paleontological resources would be minimized by continuing inventory of cultural resources and by following up on reports of discoveries by the miners.

Unavoidable Adverse Impacts

Since no testing and little survey would be done prior to most surface disturbing activity on mining operations, there is a possibility that cultural or paleontological resources would be impacted or destroyed without the operators' knowledge. Even if extensive testing and surveying took place, the potential for missing such resources is great due to heavy vegetation, the large areas involved, and the depth of burial for most sites. Heavy equipment can destroy such resources without the operator being aware of the damage.

Short-Term Uses vs Long-Term Productivity

Cultural and paleontological resources would be preserved to a greater extent if no mining took place, but the knowledge gleaned from their discovery would not exist. However, it does not seem likely that continued operation with heavy equipment would result in much further discovery due to the destructive nature of such techniques. Constant monitoring of such operations may result in better discovery and recovery, but it could also slow mining operations.

Irreversible and Irretrievable Commitments of Resources

Cultural and paleontological resources are finite and non-renewable. Regardless of standards set for differing alternatives, it would be the initial surface-disturbing activity that primarily impacts such resources. Such resources, once damaged, would be irretrievably lost. Not only would the material possibly be lost, but so would the scientific knowledge to be potentially gained from an undisturbed site. These resources may include structures, soil stratigraphy, bones and other fossils, pollen, and ash. The process of assessing and monitoring site-specific mining operations is the most important form of protection for these resources.

4.9 Subsistence

In general, any action which disturbs the land, its vegetative cover, the quality or quantity of water resources, wildlife or fish populations, or human or animal access routes may have an impact on subsistence uses and needs.

Such potentially impacting actions may occur all at once or gradually, so that the cumulative impact may build over time to increasingly affect subsistence. Further, cumulative impacts to subsistence uses and needs may occur strictly from human-caused events, or from naturally caused effects, or a combination of the two. When the latter is the case, it often becomes very difficult to quantify exactly how much of the cumulative impact is human-caused versus how much is caused by nature. Moreover, agreement on exact percentage of human versus nature-caused impacts may be difficult to achieve due the the differing viewpoints or assumptions of people viewing the impacts. Also of potential dispute is how much of impacts seen today are the result of recent or ongoing events versus how much were caused by past events which, in some cases, could still be causing effects.

Wares of the northern fur trade, circa 1908. From the "Toni" Troseth collection. Courtesy of the Alaska and Polar Regions Department Archives, University of Alaska, Fairbanks.

In general, placer mining has the potential to impact subsistence uses and needs in the following ways:

1. Through a reduction in the potable water quality of a stream used as a source of drinking water.

2. Through disturbance or destruction of fisheries, animal populations, or habitats which support subsistence fishing, hunting, or trapping.

3. Through resulting increased harvest pressure due to the creation of more or better access routes into an area.

Other examples of human-caused potential impacts in the Fortymile River drainage include changes in hunting/trapping/fishing technology, changes in the numbers of people involved, or changes in the amount of harvest.

In the latter examples, the federal government, including BLM, may or may not have full or even any control over the impact. Also, fires may be human-caused, but their effects may be just as unpredictable as natural fires for destroying or improving wildlife habitat, populations, or causing sedimentation of streams. Further, developments may occur on private or State lands, besides federal lands, and lead to new subsistence patterns or pressures. And the type or amount of sub-

sistence resource harvest can vary due to decisions by the State of Alaska in regulating fish and game populations.

Other potential human-caused impacts to the Fortymile River drainage relate to the amount of enforcement of environmental laws by responsible State or federal agencies besides the BLM (Chapter One).

Finally, examples of potential nature-caused impacts to subsistence uses and needs in the Fortymile River drainage include: natural stream changes, erosion, and sedimentation; and natural permafrost degradation, also resulting in sedimentation.

Despite the above-listed potential impacts to subsistence uses and needs, there is one other major consideration to be included in assessing the potential significance of mining-related impacts on subsistence--namely how much subsistence activity is occurring in the Fortymile River drainage, and how important it is.

Consistent with the data presented in the subsistence section in Chapter Three, current village-based subsistence use of the Fortymile River drainage occurs, although none of the communities except Chicken are located within the study area. Subsistence hunting and trapping is done in the region, particularly along roaded areas, but subsistence fishing appears to be virtually absent. This is because people from the Eagle, Northway, and Dot Lake areas utilize fish resources closer to their villages in the Yukon or Tanana River drainages. People from Chicken, in contrast, are largely non-subsistence oriented in their lifestyle, with most residents involved in mining. Food supplies are largely bought commercially and brought in via the Taylor Highway. Thus, while "the cumulative effects of placer gold mining within the Fortymile River system have been to reduce the amount of habitat available for use by resident fish, and perhaps by salmon as well" (ADF&G 1987b), the actual impact on subsistence usage has been minimal since utilization of these resources has not been particularly significant for much of the 20th century. Further, as to the effects of recent mining on water quality, "mining at current levels and as currently practiced in the Fortymile River drainage, has little influence on physical water quality parameters in the basin" (Dames & Moore 1988). Thus, there is no evidence that the cumulative effect of mining in the Fortymile River drainage is causing a significant negative impact on water quality as related to subsistence.

ANILCA 810(a) Evaluation and Finding -- General Consideration

One of the purposes of an ANILCA 810 evaluation is to identify whether subsistence uses are being significantly restricted. Under the BLM definition of a "significant restriction to subsistence use", this level of restriction appears not to have happened in the past, nor to be happening now from mining activities or other causes (Chapter Three). However, certain long-term gradual decreases or changes in fish and wildlife populations may have occurred in the past or are occurring now. If not mitigated, these could cause more pronounced future impacts to those resources although, as noted, their subsistence usage in any case appears to be minimal to non-existent. To follow, the focus of each respective ANILCA 810 evaluation and finding for each alternative will be

on how much, if any, new or increased contributions it would make in causing the downstream effects of:

1. Decreased fish or wildlife populations, including reduction indirectly caused through increased access.

2. Decreased terrestrial or aquatic habitat.

3. Decreased access to subsistence resources.

4. Any other water-related impacts, such as turbidity or deterioration of potential drinking water.

ANILCA Section 810 (a): Consideration of the Availability of Other Lands and Other Alternatives.

At the end of this environmental analysis process, BLM will have analyzed all and only the lands relevant to the purposes of this study, namely the lands involved in the Fortymile River watershed. Thus, this document is considering all relevant lands so that there are no "other lands" which could be considered. The Proposed Action and the four alternatives constitute the "other alternatives" required for consideration by ANILCA Section 810.

4.9.1 Proposed Action

As noted under the description in Chapter Two, the Proposed Action would incorporate enhanced reclamation for mining on federal claims.

Past and Projected Future Cumulative Impacts

Mining has caused no significant cumulative past impacts to subsistence uses or needs. As indicated above, this is due principally to the fact that the Fortymile River drainage is not now, nor has it been, a significant subsistence use area for much of this century. Usage is relatively limited and is mostly confined to hunting and trapping along areas accessible by road--with those activities not notably impacted by mining per se. If anything, such subsistence activities are more affected by the overall general increase in use of the Taylor Highway by recreationists, sports hunters, and others--none of which is necessarily related to mining, and is not within BLM's jurisdiction.

Presently, as discussed under the Proposed Action (Chapter Four, Section 4.7.1), certain unavoidable adverse impacts to fishery resources likely would occur at times in certain localized areas. However, their overall effect would be alleviated by the degree of adherence to the water quality standards set for the Proposed Action, with the result being that it is unlikely that placer mining in these areas would cause significant losses to the overall Fortymile River fishery.

In the future, water quality standards would be applied to all operations including those on non-BLM managed lands. As in 1987, no notable impacts on fish and animal populations, habitat, drinking water, or human access would result.

Potential future cumulative sedimentation, particularly from non- point sources, may affect fish spawning areas nearest the active mining (Section 4.7, Fisheries). If such sedimentation were to occur in the future, it would have the effect of decreasing upstream spawning areas so that spawning might be pushed farther downstream. If this were to happen, subsistence fishing, on balance, still would not be notably impacted due to its relatively limited occurrence in the Fortymile River drainage.

More recreationists, sports hunters, and others might enter previously remote areas using increased access created for projected mining. Consequently, localized animal or fish populations could decrease due to increased harvest pressures, or by certain species avoiding the presence of humans. Yet, however true these theoretical effects would be, the reality of relatively limited subsistence usage ongoing in the Fortymile River drainage at present would argue against such effects actually becoming significant for impacting subsistence. Further, if new hunting or fishing pressures were to become notable in the Fortymile River drainage, the State of Alaska has regulatory authority and responsibility to adjust harvest levels so that stocks are not significantly reduced and that subsistence usage be given a priority over sports usage.

Compliance with Section 810 (a) of ANILCA: Evaluation and Finding

1. **Uses and Needs.** As discussed above and elsewhere, mining on BLM-managed lands under the Proposed Action would result in no notable impacts to water quality, or fishery resources. Mining on non-BLM managed lands is likely to have the same negligible impacts. As a consequence, mining in general in the Fortymile River drainage under the Proposed Action is unlikely to have significant impacts on subsistence uses or needs, as downstream fish and animal populations, habitat, and human access to subsistence resources are unlikely to be impacted in any notable way. The cumulative effect would be that any new mining under the Proposed Action would not appreciably add to any prior accumulation of impacts that might have resulted from past mining or any other human-caused events.

2. **Section 810 (a) Finding for the Proposed Action.** The Proposed Action would not result in a significant restriction to subsistence uses. The reasons for this finding are in the preceding sections with supporting information found in other sections analyzing the impacts to fish, wildlife, water, and soils for this alternative.

4.9.2 Alternative A

Alternative A would be similar to the Proposed Action. The main difference is that performance standards under Alternative A for reclamation of fish and wildlife habitats, and soil and vegetation stabilization would be less restrictive than under the Proposed Action. Thus, the net effect of impacts to subsistence uses, users, and resources would be the same as under the Proposed Ac-

tion, namely little to none. Accordingly, the impact analysis statements concerning subsistence for the Proposed Action apply to Alternative A, and should be read for further information.

Compliance with Section 810 (a) of ANILCA: Evaluation and Finding

1. **Uses and Needs.** The statements made under this heading for the Proposed Action completely apply to Alternative A because the finding of no significant effect on subsistence uses and needs is the same in light of the limited ongoing subsistence usage of the area.

2. **Section 810 (a) Finding for Alternative A.** Alternative A would not result in a significant restriction to subsistence uses. The direct reasons for this finding are given in the preceding sections, with supporting information found in other sections analyzing the impacts to fish and wildlife, water, and soils for this alternative.

4.9.3 Alternative B

Alternative B would be similar to the Proposed Action and Alternative A. Performance standards for water quality would remain the same as Alternative A, leading to the same lack of potential downstream impacts to subsistence uses, users, and resources. Reclamation standards, however, would be more stringent than Alternative A. As a result, the likely downstream effects of Alternative B, like the Proposed Action, would be little to none.

Compliance with Section 810 (a) of ANILCA: Evaluation and Finding

1. **Uses and Needs.** The statements under this heading for the Proposed Action completely apply to Alternative B because the finding of no significant effect on subsistence uses and needs is the same in light of the limited ongoing subsistence usage of the area.

2. **Section 810 (a) Finding for Alternative B.** Alternative B would not result in a significant restriction to subsistence uses. The reasons for this finding are given in preceding sections, with supporting information found in other sections analyzing the impacts to fish and wildlife, water, and soils for this alternative.

4.9.4 Alternative C

Alternative C would be similar to the Proposed Action and Alternatives A and B. The main differences, as they might relate to subsistence, are that water quality performance standards are more stringent and that enhanced reclamation would be required on all operations. The likely downstream effects on subsistence uses, users, and resources again would not be different than under the Proposed Action or Alternatives A or B, namely little to none.

Compliance with Section 810 (a) of ANILCA: Evaluation and Finding

1. Uses and Needs. The statements made under this heading for the Proposed Action completely apply to Alternative C because the finding of no significant effect on subsistence uses and needs is the same in light of the limited ongoing subsistence usage of the area.

2. Section 810 (a) Finding for Alternative C. Alternative C would not result in a significant restriction to subsistence uses. The direct reasons for this finding are given in the preceding sections with supporting information found in other sections analyzing the impacts to fish and wildlife, water, and soils for this alternative.

4.9.5 Alternative D

As indicated under the description of this alternative, no mining would occur on federal mining claims, although stabilization of surface disturbances that have occurred since 1980 would be required. Further restoration of mined areas would proceed by natural processes. The net result of this for subsistence uses, users, and resources would be in the range of minimal to no impact.

Natural erosion during spring runoff or at other times of high water could cause some turbidity in areas downstream from federal mining claims where further restoration may not take place. Still, as discussed in Sections 4.4 and 4.7 for this alternative, the resulting downstream effects are predicted to be negligible and temporary. They would not contribute appreciably to the accumulation of past events that may have caused some degree of impact to subsistence resources or activities in or around the Fortymile River watershed. Otherwise, the downstream effects on subsistence resources and users would be no different than under the Proposed Action or any alternative. In terms of access, potential impacts might even be less. Without further federal mining, fewer access roads would be built, and presumably fewer people would enter the area to impact fish and wildlife or their habitats. Overall, the level of impacts would be similar to those stated for the Proposed Action.

Compliance with Section 810 (a) of ANILCA: Evaluation and Finding

1. Uses and Needs. The statements made under this heading for the Proposed Action essentially apply to Alternative D because the net effect is similar on subsistence uses and needs. As noted in the preceding section, the impact to subsistence uses, users, and resources would be in the range of minimal to none, with the overall effect still negligible even under a "minimal impact" situation, where natural erosion might cause turbidity in the Fortymile River on a temporary basis.

2. Section 810 (a) Finding for Alternative D. Alternative D would not result in a significant restriction to subsistence uses. The direct reasons for this finding are given in the preceding sections, with supporting information found in other sections analyzing the impacts to fish and wildlife, water, and soils for this alternative.

Summary of ANILCA Section 810 (a) Findings

The findings for all alternatives, including the Proposed Action, were the same; namely, none would result in a significant restriction to subsistence uses. The predicted impacts to subsistence uses, users, and resources under all alternatives were evaluated to be negligible or nonexistent. This conclusion was reached for each alternative because only negligible-to-no effects were predicted from any of the alternatives on animal populations, habitat, human access, or general water quality.

Finally, it should be noted that in arriving at these evaluations and findings, potential immediate, future, and cumulative impacts were considered.

4.9.6 Special Considerations

Cumulative Impacts

Cumulative impacts to subsistence resources are a complex interrelationship of impacts to the natural resources of habitat, wildlife, and fisheries populations, and impacts by humans including harvest by subsistence and non-subsistence users, and changes in cultural patterns, over time. No significant cumulative impacts to subsistence resources and uses have occurred during the period of historic mining, and no significant restriction is projected for the Proposed Action or any of the alternatives.

Unavoidable Adverse Impacts

Under the Proposed Action and all alternatives no cumulative unavoidable impacts are likely to occur to subsistence users or resources anywhere in downstream areas where relatively limited subsistence activities may be occurring.

Short-Term Uses vs Long-Term Productivity

The Proposed Action and all alternatives should have no notable impacts either to cause long-term or short-term productivity changes in the availability of wild, renewable resources used to a relatively limited extent by the few subsistence users of the region.

Irreversible and Irretrievable Commitments of Resources

No irreversible and irretrievable impacts are likely to occur under the Proposed Action and all alternatives to downstream areas where such limited subsistence usage may occur.

4.10 Recreation and Visual Resources

Additional mining is predicted primarily on Wade Creek, Walker Fork, Bullion/Hutchinson Creeks, and in the vicinity of Chicken and Boundary, as indicated in Section 2.5. Most mining would there-

fore occur upstream of scenic rivers, or on scenic and recreational river segments. No mining is predicted on wild rivers, although Hutchinson and Boundary Creeks are upstream of the North Fork Wild River segment.

Recreation: General Consequences, All Alternatives

Continued mining in the watershed would have the most impacts in the areas where recreation use and highly mineralized zones are coincident. Problems arise where placer mining and suction dredging occur in the same stretch of river used by float boaters seeking a semi-primitive recreation experience, such as on the Fortymile River below the Taylor Highway bridge. Because wild segments of the Wild and Scenic River system do not have large numbers of mining claims or a high probability of mineral development, float boaters seeking a more primitive setting may use the Middle or Mosquito Forks, or the North Fork above the Kink. Because they can only be reached by air, trips on these more isolated stream segments involve higher costs, require more advance planning, and are longer and therefore require more time to complete than a trip down one of the highway-accessible scenic river segments. These factors will limit the shift in visitor use, and substantially increased use of the wild rivers is not expected.

During periods of low water, submerged dredge tailings just below the water level would be an occasional hazard for float and motorized boats. The contour of the tailing pile is usually streamlined and does not cause turbulence; consequently boats would be likely to hang up on the tailings without warning. This situation would occur mostly on the South Fork Fortymile River. Float and motorized boaters would also encounter navigational problems when the water is high or highly turbid, which reduces the opportunity to avoid submerged hazards. Between one and three accidents can be expected each year as determined through casual conversation and observations made during river patrols. At highest risk for boating accidents are canoeists and recreational suction dredge miners who may be inexperienced boaters and unfamiliar with the river. Equipment and material lost during a boating accident is usually swept downriver and not recovered by the owner.

Visual Resources: General Consequences, All Alternatives

To evaluate the cumulative impact of predicted levels of mining activity on visual resources, one must consider where mining is most likely to occur, the existing visual character of that area, the degree to which it will be altered by new activity, and how changes in the landscape are perceived by visitors.

The areas where additional mining is predicted have all been mined previously and contain visual evidence of that activity, both recent and historical. As discussed in Section 3.10.2, the characteristic landscape was one in which the effects of mining were evident to various degrees, before the Fortymile National Wild, Scenic, and Recreational River was designated. U.S. Geological Survey 1:63,360 series topographic maps published in 1956 show major human modifications to the environment in all these areas. Mapped features include extensive dredge tailings on Wade Creek and on the small streams in the vicinity of Chicken and Boundary, a landing strip at Hutchinson Creek, and structures scattered throughout the mining areas. Mining has continued up to the

present in all these areas, although activity level has fluctuated over the years with changes in economic conditions.

Visitor perception of changes in the landscape depends on individual preferences and expectations, and the viewer's position in the landscape relative to the position of the mining operation and associated improvements. Objectives for visiting an area to a large part determine visitor's visual preferences. Individual objectives cover a wide spectrum, ranging from those who come specifically to see the historical mining district, for whom the opportunity to view an active mine would enhance their experience, to visitors who come solely to float the river and enjoy the natural environment, who have no interest in the gold mining history of the area, and for whom an active operation is an undesirable blight on the natural landscape.

The readily accessible portions of the scenic rivers, where convenient put-in and take-out sites exist, and which lend themselves to short trips, will continue to be subjected to mining activity as they have in the past. When declining gold prices and rising costs brought about a lull in mining activity from the late 1960s to late 70s, it was possible to float most portions of the Fortymile that would later be designated as "scenic," and not see mines operating or evidence of new activity. The same is not true today and will not be true in the future as long as mining remains economically viable. Visitors who come solely to enjoy the natural landscape would perceive the natural landscape to be degraded by mining. Yet, it was not Congressional intent that these areas be preserved in an unmodified setting; hence, they were designated as "scenic" rather than "wild." The clear intent was that mineral development should continue on valid existing claims. Wild landscapes would continue to be available to those who desire them, on the wild segments and many of the more inaccessible scenic segments of the system.

Given the broad range of visitor preferences, it is still true that visitors in general expect a rural landscape throughout the affected area, and not one that is dominated by mining activity to the point that the setting takes on an industrial appearance. However, such a scenario is unlikely. Depending on the alternative, total mines projected to be operating at one time in the Fortymile drainage range from 17 to 40, at scattered locations similar to the 1987 mining season, when 30 placer mines operated on approximately 27 different streams. Locally heavy concentrations of mining activity may continue where there are clusters of mining claims with good highway access, such as in the vicinity of Chicken and Boundary. However, taken as a whole, the landscape of the scenic river sections of the Fortymile drainage will continue to fit, about as well as they ever did, the description of a scenic river contained in the Wild and Scenic Rivers Act: "...with shorelines or watersheds still largely primitive and shorelines largely undeveloped..."

The effects of the various alternatives would be growing areas of human development in areas where the natural landscape has already been modified, in some cases substantially.

Depending on the alternative, between 391 and 920 acres would be mined and between 313 and 692 acres would remain barren or sparsely vegetated after 50 years. The effect would be one of incremental change to the existing environment, since the disturbance would be spread over many miles in as many as 27 different drainages and sub-drainages, which have already been subjected to past mining.

However, while the cumulative effect under all the alternatives would be a relatively small change to the existing environment, it is also likely that without preparing and implementing an interagency plan to manage visual resources within the viewshed of the Fortymile National Wild, Scenic, and Recreational River, the Congressional objective stated in the Wild and Scenic Rivers Act, of "preventing unnecessary impairments to the scenery," cannot be fully met. Under all of the alternatives, impacts could be minimized by employing mitigating measures presented in Section 4.12.

4.10.1 Proposed Action

Recreation

The development of approximately 109 miles of additional roads (150% above present mileage) over the next 10 years would provide additional opportunities for motorized recreation, and participation in these types of activities might increase slightly. Opportunities for dispersed site camping, and general touring and sightseeing would be enhanced by the Proposed Action. There would also be additional opportunities for vehicle-based big-game hunting. Increased hunting access would be counter-balanced to some degree by effects that could reduce big-game populations, particularly moose, as described in Section 4.6.1.

Because 79.9 miles of new road would represent an upgrade of existing motorized trails, current trail riding opportunities for motorcycles and ATVs would be displaced. Only 64.8 miles of new trails would be created under the Proposed Action, causing a moderate reduction in trail riding opportunities (19% less trail mileage than at present).

As indicated in Section 4.4.1, water quality would be similar to or slightly better than in 1987. Opportunities for recreational gold panning, float boating, and fishing would be maintained or slightly enhanced. Recreational float boating would probably remain at about the same level as in 1987 or increase slightly, due to an increase in tourism and State population.

Visual Resources

Equipment along shore, below the ordinary high water mark, and boats and dredges on the water would be visible to recreational boaters. Long-term camps would be screened, yet the feeling of solitude would be interrupted by human presence and noises from the motorized equipment.

Riverbed and shore disturbances by suction dredging, unlike cat mining, are short-term events often not exceeding one year In duration. At the beginning of each season, from May through mid-June, the riverbed would appear undisturbed by suction dredge mining due to the natural action of the river in leveling and dispersing tailings. It would be unlikely for a casual observer to recognize shore areas that were mined the previous year. Current season suction dredge tailings and cuts would start surfacing as the water level recedes, mid-June through August. Natural reclamation occurs during spring breakup and throughout the summer during high water events, which recontour the tailings, and fill and reshape the cuts.

Construction of additional roads and trails would create additional contrast with the natural landscape. There would be approximately 94 more miles of routes than currently exist. Mining operations would cover 920 acres, of which half, or 460 acres, would be on old dredge tailings which already represent a significant alteration to the natural landscape. Newly disturbed acreage represents an initial increase of 36% above the previously disturbed area of 1,288 acres. Intensive reclamation, including fertilizing and reseeding of some areas, would speed the recovery rate in areas capable of supporting vegetation. Approximately 213 acres would revegetate in 25 to 30 years and return to a natural appearance, with an additional 227 acres revegetated in 50 years. The long-term effect would be that 540 acres (about 50% more acreage than is barren at present) would remain barren. New mining occurring on previously mined but unreclaimed areas would have a beneficial impact over the long term, because rows of old tailings would be reshaped to resemble the form and line of natural topography.

4.10.2 Alternative A

Recreation

The development of approximately 78 miles of additional roads (108% above present mileage) over the next 10 years would provide additional opportunities for motorized recreation, and participation in these types of activities might increase slightly. Opportunities for dispersed site camping, recreational gold panning, and general touring and sightseeing would all be enhanced by Alternative A. There would also be additional opportunities for vehicle-based big-game hunting. The beneficial effect of increased hunting access would be counter-balanced to some degree by adverse effects that could reduce big-game populations, particularly moose, as described in Section 4.6.2.

Current trail riding opportunities for motorcycles and ATVs would be displaced by the upgrade of trails into roads. Only 56 miles of new trails would be created under Alternative A, causing a moderate reduction in trail riding opportunities (30% less trail mileage than at present).

Compared to conditions during the 1987 season, slightly improved water quality would result in increased quality of floatboating and fishing, and a corresponding slight increase in use.

Visual Resources

Impacts from suction dredging would be similar to those described for the Proposed Action.

Additional roads and trails would be constructed, which would create additional contrast with the natural landscape. There would be approximately 55 more miles of routes than currently exist. Mining operations would cover 805 acres, of which half, or 403 acres, would be on old dredge tailings which already represent a significant alteration of the natural landscape. Newly disturbed acreage represents an initial increase of 32% above the previously disturbed area of 1,288 acres. Since 318 acres would revegetate within 30 to 50 years, the long-term effect would be that 644 acres (about 60% more acreage than what is presently barren) would remain barren or sparsely vegetated. Unlike the Proposed Action and Alternatives B and C, no long-term improvement

would occur when old mined areas are reworked, because reclamation would not include reshaping tailings to resemble the natural topography. This lack of reshaping would also reduce the perception of naturalness on the 318 acres that would revegetate.

4.10.3 Alternative B

Recreation

The anticipated impacts from mining activity on recreation resources would be essentially identical to those of Alternative A (Section 4.10.2).

Visual Resources

Impacts from suction dredging would be similar to those described for the Proposed Action and Alternative A.

Alternative B would disturb the same amount of acreage as Alternative A. There would be a total of approximately 55 more miles of routes than currently exist. Mining operations would cover 805 acres, of which half, or 403 acres, would be on old dredge tailings, which already represent a significant alteration of the natural landscape. Newly disturbed acreage represents an initial increase of 32% above the previously disturbed area of 1,288 acres. However, Alternative B's stricter reclamation standards would result in fewer acres remaining barren, and in faster plant growth on areas capable of supporting vegetation. Since 186 acres would revegetate in about 30 years and return to a natural appearance, the long-term effect would be that 558 acres, or (about 52% more acreage than what would result from present disturbance) would remain visibly disturbed by mining activity. New mining occurring on previously mined but unreclaimed areas would have a beneficial impact over the long term, because rows of old tailings would be reshaped to resemble the form and line of natural topography.

4.10.4 Alternative C

Recreation

The development of approximately 54 miles of additional roads (75% above present mileage) over the next 10 years would provide additional opportunities for motorized recreation, and participation in these types of activities might increase slightly. Opportunities for dispersed site camping, recreational gold panning, and general touring and sightseeing would all be enhanced by Alternative C. There would also be additional opportunities for vehicle-based big-game hunting. The beneficial effect of increased hunting access would be counter-balanced to some degree by adverse effects that could reduce big-game populations, particularly moose, as described in Section 4.6.4.

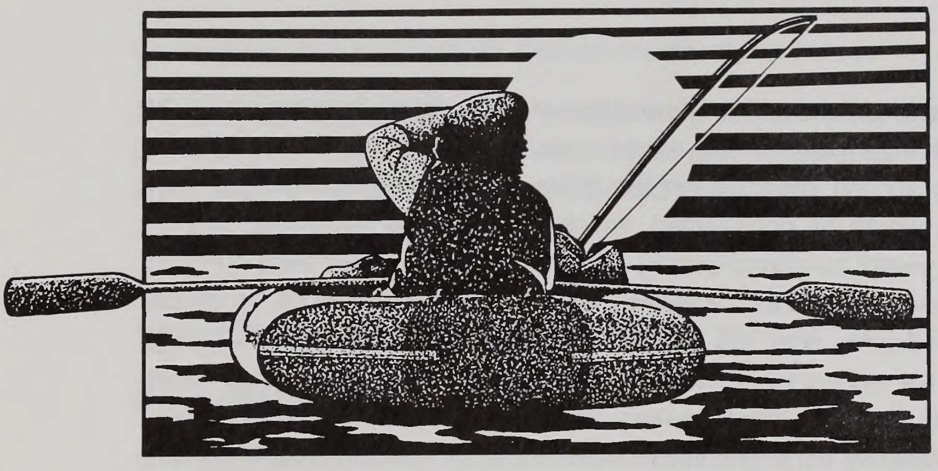
Because most of the new road miles would represent an upgrade of existing motorized trails, current trail riding opportunities for motorcycles and ATVs would be displaced. Only 47.2 miles of

trails would exist under Alternative C, causing a moderately large reduction in trail riding opportunities (41% less trail mileage than at present).

Positive impacts to fishing and floatboating would be slightly greater than under any of the other alternatives, due to the combination of higher water quality standards and intensive reclamation efforts. Floatboating, fishing, and associated recreation use would increase over 1987 levels.

Visual Resources

Impacts from suction dredging would be similar to those described for the Proposed Action.


Fishing

Additional roads and trails would be constructed, which would create additional contrast with the natural landscape. There would be approximately 21 more miles of routes than currently exist. Mining operations would cover 690 acres, of which half, or 345 acres, would be on old dredge tailings, which already significantly alter the natural landscape. Newly disturbed acreage represents an initial increase of 27% above the previously disturbed area of 1,288 acres. Alternative C requires the same reclamation efforts as for federal claims under the Proposed Action. Since 400 acres would revegetate in 25 to 50 years and return to a natural appearance, the long-term effect would be that 405 acres (about 38% more acreage than is presently barren) would remain barren or sparsely vegetated. New mining occurring on previously mined but unreclaimed areas would have a beneficial impact over the long term, because rows of old tailings would be reshaped to resemble the form and line of natural topography.

4.10.5 Alternative D

Recreation

The development of approximately 44 miles of additional roads (61% above present mileage) over the next 10 years would provide additional opportunities for motorized recreation, and participation in these types of activities might increase slightly. Opportunities for dispersed site camping, recreational gold panning, and general touring and sightseeing would all be enhanced by Alternative D. There would also be additional opportunities for vehicle-based big-game hunting. The beneficial effect of increased hunting access would be counter-balanced to some degree by adverse effects that could reduce big-game populations, particularly moose, as described in Section 4.6.5.

Because many of the new road miles would represent an upgrade of existing motorized trails, current trail riding opportunities for motorcycles and ATVs would be displaced. Because new trails would also be created under Alternative D, the actual reduction in trail riding opportunities would be small (13% less trail mileage than at present).

With the cessation of federal mining operations, it is expected that water quality within the Wild and Scenic River would marginally improve compared to conditions in 1987. Improved water quality would have a direct beneficial effect on the quality of float boating and fishing opportunities, particularly on the South Fork and the Fortymile mainstem. Recreational float boating would probably remain at, or slightly above, 1987 levels.

Visual Resources

By ending all mining activity on federal lands, the introduction of new visual impacts would be stopped, but some visual impacts from past mining would remain. Impacts would continue on State and private lands, including suction dredging on the State-managed navigable river segments. Additional roads and trails would be constructed, which would create additional contrast with the natural landscape. There would be approximately 41 more miles of routes than currently exist. Mining operations would cover 391 acres, of which half, or 196 acres, would be on old dredge tailings which already significantly alter the natural landscape. Newly disturbed acreage represents an initial increase of 15% above the previously disturbed area of 1,288 acres. Since 277 acres would revegetate in 40 to 50 years, the long-term effect would be that 271 acres (about 25% more acreage than what is presently barren) would remain barren or sparsely vegetated. Unlike the Proposed Action and Alternatives B and C, no long-term improvement would occur when old mined areas are reworked, because reclamation would not include reshaping tailings to resemble the natural topography. This lack of reshaping would also reduce the perception of naturalness on the 277 acres that would revegetate.

4.10.6 Special Considerations

Cumulative Impacts

Cumulative negative impacts to the quality of primitive recreation opportunities and visual resources result from surface disturbance, water quality reductions, and access route construction which has occurred from past, current, and projected mining in the watershed. Access route construction has also had cumulative positive impacts on both primitive and motorized forms of recreation. Mining has provided access into the watershed, with 72.5 miles of trails and 80 miles of roads from historic and current activities. In decreasing order of additional access,the alternatives are: Proposed Action, Alternatives A and B, Alternative C, and Alternative D. For impacts to visual resources, see cumulative impacts to landcover (Section 4.5) for acreage of surface disturbance and long-term barren areas.

Unavoidable Adverse Impacts

Under all of the alternatives, mining's effect on the quality of non-motorized recreation experiences in a natural environment is an adverse impact which cannot be totally mitigated. Similarly, any amount of mining activity would have some impact to visual resources.

Short-Term Uses vs Long-Term Productivity

Existing and projected new surface disturbance would have long- term effects on visual resources and the quality of non-motorized recreation in a natural environment, since a portion of the disturbed acreage would remain barren or sparsely vegetated.

Irreversible and Irretrievable Commitments of Resources

Acreage that remains incapable of supporting vegetation as described in Section 4.5.6 constitutes an irreversible commitment of resources, and would thus have irreversible effects on visual resources and the quality of non-motorized recreation.

4.11 Socio-Economics

Introduction

Quantifiable economic impacts related to changes in recreation use are not included in this analysis because of lack of data regarding changes in recreation use and expenditures for the various recreation uses. Generally, recreation related expenditures would increase as the amount of recreation use increases. While these expenditures would increase for all the alternatives, the amount of change for each alternative can't be determined. The cause and effect relationship described below would apply to all the alternatives.

As water quality improves, recreation use (boating and fishing) and related expenditures for equipment, food, lodging, fuel, transportation, and services should increase. Similarly, improved access related to more roads and trails should also increase hunting, camping, sightseeing, and vehicle touring opportunities and related expenditures. Increases in recreation expenditures would also support increased employment and earnings.

More roads and trails would be developed with the Proposed Action and Alternatives A and B than with Alternatives C or D. Therefore, the amount of hunting, camping, sightseeing, and vehicle touring and related expenditures should increase faster with the Proposed Action and Alternatives A and B. Related employment and earnings should also increase faster with these alternatives.

Without a reliable estimate of the net change in recreation use or net change in recreation use expenditure data, the net change in earning and employment for each alternative cannot be determined nor can the relative difference in impacts among the alternatives be predicted. It is, however, reasonable to expect that earnings and employment related to recreation use would in-

crease with all the alternatives. These increases would be beyond those related to mining activity which are described below.

The estimated economic impact associated with the various alternatives are based on a report entitled "Regional Economic Impacts of Placer Mining at Birch Creek, Alaska" (BOM 1988). Economic data from this report were used to project economic impacts from the Fortymile placer mining operations. The relationship between the number of mines within Birch Creek to the economic impacts was applied to the number of mines anticipated within the Fortymile drainage.

4.11.1 Proposed Action

The annual water treatment cost for a placer mine processing 50,000 cubic yards per year under the Proposed Action's performance standards is estimated to be $1,900 (EPA 1987b). The water treatment technique selected would require one hour of settling in a primary settling pond and three hours in the secondary pond. During the mining season the primary and secondary pond would be built four times and once, respectively. Most operators would probably need to obtain an EPA variance to meet the water quality standards of the Proposed Action. See Figure 4-7 for the total estimated water treatment, reclamation, and BLM administration costs for federal mines. BLM's administrative cost for each alternative are discussed in Appendix B-3.

Total Costs for all Federal Mines	Proposed Action (23 mines)	Alternatives			
		A (20 mines)	B (20 mines)	C (18 mines)	D (No mines)
Reclamation Cost	$78,200	$20,000	$40,000	$61,200	NA
Water Treatment Cost	$43,700	$362,000	$362,000	$541,800	NA
BLM Administrative Cost	$59,800	$28,000	$44,000	$46,800	See Caption

Figure 4-7. Estimated costs for all federal mines associated with implementation of each alternative. The costs for state mines have not been included because BLM does not have regulatory authority for these operations. Sources: BLM, EPA, NPS. For Alternative D, validity examinations and appraisals were estimated to cost $2,000 per claim, and the net present value of each claim was estimated to be between $12,000 and $335,000. See Appendix B-3 for methodology for computing costs.

The reclamation cost for a placer mine operating on federal claims is estimated to be approximately $3,400 per year. This estimate is based on each mine reclaiming two acres per year at a cost of $1,700 per acre. See Appendix B-1 for assumptions regarding mine disturbance and reclamation acreages. The reclamation cost for mines on State and private lands is estimated to be about $1,000 per year, or approximately $500 per acre, assuming two acres are reclaimed each year. The cost for these mines is lower than for federal mines because less reclamation is required, i.e., regrading of tailings is required for satisfactory reclamation. The cost for reclaiming non-federal lands is the same for the Proposed Action, and Alternatives A, B, and D. See Appendix E-3 for a breakdown of reclamation costs for federal mines.

With a continuation of present management, it is assumed that the total number of mines within the watershed would increase from 33 to 40 over the next decade.

Direct employment would increase by an average of 28 workers while direct earnings would increase by approximately $7.3 million and mining output would increase by approximately $15.5 million over a 10-year period (See Figure 4-8).

Alternative	No. of Mines	Employment (average) (workers)	Earnings (millions)	Output (millions)
Proposed Action	40	155	43	86.9
A or B	35	135	37.9	75.9
Status Quo (1987 level)	33	127	35.7	71.4
C	30	118	33.7	70.0
D	17	68	19.1	38.6

Figure 4-8. Summary Comparison of Direct Economic Impacts over a 10 Year Period.

Local rural population in the Fortymile drainage would be expected to increase by about 40 people, assuming that 48% of the additional miners would reside within the drainage or in nearby communities, and the population would increase by three individuals for each additional miner.

Anticipated regional economic impacts are displayed in Figure 4-9. These represent both direct plus indirect cumulative impacts to the greater Fairbanks area. Total employment would increase by 41 workers, while over a 10-year period earnings would be $10.9 million greater and output would be $26.3 million greater.

Alternative	No. of Mines	Employment (average) (workers)	Earnings (millions)	Output (millions)
Proposed Action	40	235	$64.5	$147.7
A or B	35	206	$56.9	$129.1
Status Quo (continuation of current activity)	33	194	$53.6	$121.4
C	30	179	$50.6	$113.9
D	17	103	$28.6	$65.6

Figure 4-9. Cumulative economic impacts on Greater Fairbanks of placer mining in Fortymile River drainage, Alaska, over a 10-year period.

4.11.2 Alternative A

Additional water treatment techniques would probably be necessary to meet the stricter water quality performance standards of this alternative (no EPA variance) and would undoubtedly increase the cost of compliance. The water treatment techniques selected to meet these standards is the same simple settling system described in the Proposed Action, plus 100% recycle of mine process water. The annual water treatment cost for a placer mine, with the same capacity described in the Proposed Action, operating under the water quality performance standards of Alternative A is estimated to be $18,100 (EPA 1987b). The choice of a specific method for treating mine effluent was made solely to estimate compliance cost. This choice is not intended to require, promote, or limit the use of a specific water treatment technique.

The reclamation cost for all placer mines operating under Alternative A is estimated to be approximately $1,000 year, or $500 per acre. The reclamation activity for this alternative resembles the State reclamation standard discussed under the Proposed Action.

With Alternative A, it is assumed that the total number of mines within the watershed would increase from 33 to 35 over the next decade. If so, it is reasonable to also expect that mining expenditures, output, and employment, would also increase.

Direct employment would increase by an average of 8 workers while direct earnings would increase by approximately $2.2 million and output would increase by approximately $4.5 million over a 10-year period compared to a continuation of the 1987 level (see Figure 4-8).

Local rural population in the Fortymile drainage would be expected to increase by about 10 people, assuming that 48% of the additional miners would reside within the drainage or in nearby communities, and the population would increase by three individuals for each additional miner.

Anticipated total regional impacts (to the Greater Fairbanks area) are displayed in Figure 4-9. Compared to a continuation at the 1987 level, average employment per year would be 12 workers higher while over a 10-year period, earnings would be $3.3 million higher and output would be $7.7 million greater (see Figure 4-9).

4.11.3 Alternative B

The estimated annual water treatment cost for Alternative B is the same as Alternative A, $18,100 per operation.

The reclamation cost for a placer mine operating on federal claims is estimated to be about $2,000 per year, or about $1,000 per acre. The cost breakdown is shown in Appendix E-3. The cost for mines operating on non-federal lands is estimated to be $1,000 per year for reclaiming two acres.

The direct and indirect impacts on employment, earnings, output, and population would be the same as with Alternative A.

4.11.4 Alternative C

The compliance cost for water treatment under Alternative C would probably increase significantly over the costs for the other alternatives due to the very stringent water quality performance standards. A water treatment technique of simple settling, 100% recycle, and chemical flocculation was selected (solely for cost estimation purposes) to meet these rigorous standards. The estimated water treatment cost for a mine processing 50,000 cubic yards per year is estimated to be approximately $30,100.

The reclamation cost per mine, both federal and non-federal, is estimated to be about $3,400 per year. The reclamation standard for this alternative is the same as discussed for federal mines in the Proposed Action.

With Alternative C, it is assumed that the total number of mines within the watershed would decrease from 33 to 30 over the next decade. If so, it is reasonable to also expect that mining expenditures, output, employment, and earnings would also decrease slightly.

As the number of mines decrease from 33 to 30, direct employment would decrease by an average of 9 workers, direct earnings would be approximately $2 million less and output would be $1.4 million less over a 10-year period.

Local rural population in the Fortymile River drainage would be expected to decrease by about 10 to 15 people, assuming that 48% of the miners would reside within the drainage or in nearby communities, and the population would decrease by three individuals for each miner that leaves the area.

Regionally, total average employment would also be less (by 15 workers) than current levels. Over a 10-year period, total earnings would be $3.0 million less and output would be $7.9 million less than would occur if 33 mines continued to operate.

4.11.5 Alternative D

The estimated annual water treatment and reclamation costs for non-federal mines operating under Alternative D are estimated to be $1,900 and $1,000 respectively, the same as for the Proposed Action. Federal mines would not be operating under this alternative, but reclamation would be required on all federal claims that were disturbed after 1980. The estimated reclamation cost on these claims would be $500 per acre, the same as for non-federal mines under this alternative.

Under Alternative D, validity exams would be conducted on all properly filed federal mining claims (roughly 865 claims in the Fortymile River drainage) and appraisals would be completed on all

valid claims (all claims were assumed to be valid). Conducting and completing validity exams and appraisals were estimated to cost about $2,000 per claim. A minimum and maximum net present value (NPV) was estimated for each valid federal claim in Appendix B-3, primarily to indicate the possible cost to the federal government for buying the mining claims in the Fortymile River drainage. The estimated minimum and maximum NPV for each claim would be about $12,000 and $335,000 respectively. The estimated total minimum and maximum NPV for all 865 federal claims in the drainage would be approximately $10,380,000 and $789,775,000 respectively.

With Alternative D, it Is assumed that the total number of mines within the watershed would decrease from 33 to 17 over the next decade. Mining expenditures, output, employment, and earnings would also decrease. This too would cause an unavoidable adverse economic impact that would be most apparent in the community of Chicken.

As mining activity declines from 33 mines to 17, direct employment would decrease by an average of 59 workers per year while direct earnings would be approximately $16.6 million less and output would be $32.8 million less over a 10-year period.

Local rural population in the Fortymile drainage would be expected to decrease by less than 90 people.

Regionally, total average employment would also be less (by 91 workers) than current levels. Over a 10-year period total earnings to the Fairbanks economy would be $25 million less and output would be $55.8 million less than would occur if 33 mines continued to operate.

4.11.6 Special Considerations

Cumulative Impacts

The ten-year cumulative (direct plus indirect) economic impacts on the greater Fairbanks economy from placer mining within the Fortymile River drainage are described below.

With the Proposed Action, it Is estimated that 235 people would be employed, earnings would be about $64.5 million, and the value of output would be about $147.7 million. With Alternatives A and B, it is estimated that 206 people would be employed, earnings would be about $56.9 million, and the value of output would be about $129.1 million. With a continuation of current mining levels, it is estimated that 194 people would be employed, earnings would be about $53.6 million, and the value of output would be about $121.4 million. With Alternative C, it is estimated that 179 people would be employed, earnings would be about $50.6 million, and the value of output would be about $113.9 million. With Alternative D, it is estimated that 103 people would be employed, earnings would be about $28.6 million, and the value of output would be about $65.6 million.

Unavoidable Adverse Impacts

As the number of operating mines decreases to 30 under Alternative C, direct mining employment would decrease over 1987 levels by an average of 9 workers, while over a 10-year period direct earnings would decrease by approximately $2.0 million and output would decrease by approximately $1.4 million. Total employment in the greater Fairbanks area would decrease by 15 workers, earnings would decrease by $3.0 million, and output would decrease by $7.9 million. Local rural population in and around the Fortymile River drainage would decrease by 10 to 15 people.

With Alternative D, direct mining employment would decrease over 1987 levels by an average of 59 workers, while over a 10-year period direct earnings would decrease by approximately $16.6 million and output would decrease by approximately $32.8 million. Total employment in the greater Fairbanks area would decrease by 91 workers, earnings would decrease by $25 million, and output would decrease by $55.8 million. Local rural population in and around the Fortymile drainage would decrease by less than 90 people.

Short-Term Uses vs Long-Term Productivity

Compared to a continuation of the current level of mining, the Proposed Action and Alternatives A and B would result in greater economic output (primarily gold production) while Alternatives C and D would result in less economic output over a 10-year period.

Irreversible and Irretrievable Commitments of Resources

None of the alternatives would entail an irreversible or irretrievable commitment of human resources.

4.12 Mitigation

Mitigation actions are activities which are not specifically required by existing laws or regulations and which can be implemented to avoid or minimize the environmental impacts of a development action. Stipulations are site-specific items which are attached to a permit and are used to implement mitigation.

The Council on Environmental Quality (CEQ) regulations at 40 CFR 1508.20 define mitigation to include actions which:

a) Avoid the impact entirely,

b) Minimize impacts by limiting the degree or magnitude of the action and its implementation,

c) Rectify the impact by repairing, rehabilitating, and restoring the affected environment,

d) Reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action,

e) Compensate for the impact by replacement or by providing substitute resources or environments.

Expected short-term (5-10 years), continuous or long-term (up to 20 years or beyond), and unpredictable impacts are the types of effects that would require mitigation. To provide an appropriate level of mitigation for any impact, the extent and magnitude of the impact on the resource must be known. Figure 4-10 summarizes expected general direct and indirect impacts from mining on various resources. Effects vary as to their direct and indirect nature. All mining activities have a direct impact on the environment. In turn, these direct effects can become secondary change agents, and so on. For example, construction of an access road causes erosion. Erosion contributes to stream sedimentation. Stream sedimentation reduces spawning habitat for fish. Road construction is the primary change agent, erosion is the primary (direct) effect and a secondary change agent, sedimentation is a secondary (indirect) effect and a tertiary change agent; and finally, reduction in spawning habitat is a tertiary effect (also indirect).

Potential measures suitable for mitigating short-term and continuous or long-term impacts resulting from access, facilities, operations components of the Proposed Action and the alternatives are presented in Figures 4-11, 12, and 13. These figures contain the framework or guidelines for mitigation of mining activities for this stage of the NEPA tiering process. The mitigating measures listed for each mining action component are technically feasible, potential measures; however, specific measures would be adopted after a site-specific environmental assessment is conducted. Thus, the actual application of any mitigation measure can only be discussed and determined within the context of a proposed operation which will be addressed in the EA or EIS prepared for each proposed Plan of Operations.

As a result of this tiering process, alteration of the timing, location, and extent of a mineral development activity may be required to avoid or minimize adverse effects and/or to avoid unnecessary or undue degradation.

Many mitigative measures to replace/reclaim resources that have been altered, removed, or lost as a result of mineral development activities are an inherent part of the Proposed Action and each alternative (Section 2.5). Measures can be incorporated into the restoration techniques required in order to enhance the recovery process of physically altered areas. For example, materials can be sorted by size as part of the mining operation, and the effective use of sorted materials can enhance restoration. This is especially important in previously-mined tailings where no layer of overburden and topsoil is available. Durst (1984) found that revegetation is enhanced if the reshaping reduces the slope of tailings, and their height above the water table. In addition, plants colonize more readily if reshaping leaves a "patchy" landscape that includes low wet spots with gentle slopes and hummocks. In cases where topsoil and/or fines are very limited, better results are generally obtained by spreading these materials in a patchy manner than by evenly spreading them over only part of the area to be reclaimed. The varying degrees and levels of effectiveness

	ACCESS		FACILITIES			OPERATIONS		
	Road Construction	Use of Roads/Trails	Site Clearing/ Filling	Habitation of Facilities	Solid Waste Disposal	Stripping, Mine cuts/fills Settling basins, Stockpiles	Operation of Machinery	Fuel Spills
Geology/ Topography	P – Localized landscape modification	No significant effect	P –Localized landscape modification	No effect	No effect	P – Localized landscape modification	No effect	No effect
Soils	P – Alters/removes upper soil horizon S – Increased sediments S – Reduction of nutrient value S – Potential change in water quality	P – Compacts soils S – Increased water runoff	P – Alters/removes soil structure/reduction of soil nutrient value S – Increased water runoff	P – Compaction of soils S – Increased water runoff	P – Alters soil profile S – Introduces "non–natural" materials to soil	P – Destroys soil structure on site P – Changes particle compo–sition of soil materials P – Increase surface area to erosion	P – Compaction of soils S – Limits vegetation in short term S – Increase water runoff	P – Potential soil contamination
Water	P – Point and Non–Point sediment discharge S – Alteration of chemical water quality T – Altered eco–structure S – Increase velocity of overland flow	S – Point and Non–Point source discharge S – Increased velocity of overland flow	P – Point and Non–Point source discharge S – Increased water temp.	P – Alteration of water chemistry; increased oxygen demand S – Consumptive water use S – Altered eco–structure	P – Increased oxygen demand S – Altered eco–structure S – Potential ground water contamination	P – Increased Point and Non–Point pollution P – Increased sediment bed load/turbidity S – Alt. channel characteristics T – Altered eco–structure	P – Increase soil compaction S – Increased overland flow/ erosion T – Increased sedimentation	P – Petrochemical contam–ination of surface and ground water S – Alteration of eco–structure
Landcover and T & E Plants	P – Removes plants S – Changes revegetation composition	P – Removes plants S – Compresses vegetation	P – Removes vegetation	No effect	P – May alter vegetation composition S – May disallow natural revegetation	P – Removes fine material S – Retards rate of regrowth T – Changes vegetation composition	No significant effect	P – May alter plant composition P – May remove vegetation
Wildlife and T & E Animals	P – Habitat loss S – Reduction in numbers	P – Disturbance/disruption S – Alter habitat use T – Reduce available habitat P – Increased harvest S – Reduction in numbers	P – Habitat loss S – Reduction in numbers	P – Disturbance/disruption S – Alter habitat use T – Reduce available habitat	P – Attracts animals S – Removal of nuisance animals T – Reduction in numbers No effect on T + E animals	P – Habitat loss S – Reduction in numbers	P – Disturbance/disruption S – Alter habitat use T – Reduce available habitat	P – Habitat loss (contamination) S – Reduction in numbers
Fisheries	P – Habitat loss S – Reduction in numbers P – Migration barriers S – Reduce available habitat	P – Increased harvest S – Reduction in numbers	P – Habitat loss S – Reduction in numbers P – Migration barriers S – Reduce available habitat	No effect	P – Habitat loss (con–tamination) S – Reduction in numbers	P – Habitat loss S – Reduction in numbers P – Migration barriers S – Habitat loss P – Suspended sedim./turbidity S – Habitat loss T – Reduction in numbers P – Settleable solids/sediment S – Habitat loss T – Reduction in numbers	No effect	P – Habitat loss (contamination) S – Reduction in numbers
Cultural	P – Physical disturbance S – May detect new sites T – May destroy/lose artifacts	P – Increased access S – May detect new sites T – May lose/remove artifacts	P – Physical disturbance S – May detect new sites T – May destroy/lose artifacts	P – Increased presence of people S – May detect new sites T – May destroy/lose artifacts	P – Physical disturbance S – May detect new sites T – May destroy/lose artifacts	P – Physical disturbance S – May detect new sites T – May destroy/lose artifacts	No effect	P – Physical disturbance S – Contamination of datable material at site
Subsistence	P – Habitat Loss S – Reduction in numbers T – Limits resources to subsistence users only	P – Disturbance/disruption S – Alter habitat use T – Reduction in numbers Q – Limits resource to sub–sistence users only P – Increased access S – Increased harvest T – Reduction in numbers Q – Limits resource to sub–sistence users only	P – Habitat loss S – Reduction in numbers T – Limits resources to subsistence users only	P – Increased presence of people S – Increased harvest T – Reduction in numbers Q – Limits resources to subsistence users only	P – Habitat loss S – Reduction in numbers T – Limits resource to subsis–tence users only Q – Drinking water contamin–ation	P – Habitat loss S – Reduction in numbers T – Limits resource to subsis–tence users only P – Turbidity/sediment S – Drinking water contamin–ation	P – Disturbance/disruption S – Alter habitat use T – Reduction in numbers Q – Limits resource to subsis–tence users only	P – Habitat loss S – Reduction in numbers T – Limits resource to subsis–tence users only Q – Drinking water contam–ination
Recreation/ Visual	P – Increased roads/trails S – Increased motorized recreation T – Decreased primitive rec–reation quality P – Physical alteration S – Linear features disrupt visual scenes	P – Increased access S – Increased motorized recreation No effect on visual resources	P – Increased gravel pads structures S – Decreased primitive recreation quality P – Physical alteration S – Increased visual contrast	P – Increased presence of people S – Decreased primitive recreation quality No effect on visual resources	P – Reduction in numbers of sport hunting animals S – Decreased hunter success P – Increased solid waste S – Increased visual contrast in scene	P – Increased disturbed areas S – Decreased primitive recrea–tion quality P – Turbidity/sediment S – Decreased fishing success T – Decreased floatboating qual. P – Physical alteration S – Increased visual contrast in scent	P – Disturbance/disruption S – Decreased primitive rec–reation quality No effect on visual resources	P – Reduction in numbers S – Decreased hunter/angler success No effect on visual resources

* P – Primary * S – Secondary * T – Tertiary * Q – Quaternary

Figure 4-10. Summary of general direct and indirect impacts from placer mining activites.

of reclamation required by the Proposed Action and each alternative have been incorporated into the analysis and are discussed in their respective sections (Chapter Four).

The success of reclamation varies from site to site and depends on elevation, bedrock geology, aspect, slope, soil, water, and other factors. How each general type of mitigation would work varies from resource to resource. For example, for recreation/visual resources, access could be modified by altering mine access routes to avoid the Wild River corridor.

The visual contrast of mining facilities could be reduced by painting structures an earth-tone color, which would also lessen the negative impacts to the quality of primitive recreation experiences.

Similarly, revegetation practices such as planting willow shoots to stabilize soils would enhance recovery of shrubs and shorten the duration of habitat loss.

For some short-term and long-term effects, impacts have not been precisely estimated due to their complexity, the lack of site- specific information, or the low probability of their occurrence. Additional information would be required to develop suitable mitigation. The actual impacts would be measured through an impact monitoring program designed to detect changes in biological and/or physical parameters. A monitoring program could be implemented to 1) more accurately determine the impacts to the present resources and conditions and potential future resources and conditions, 2) determine timing, extent, and duration of physical alterations, 3) evaluate the effectiveness of reclamation or replacement, and 4) determine the need for possible modification of previous management decisions. This long-term resource/mining impact monitoring program could be conducted cooperatively by BLM and other agencies/land managers to provide information regarding the effects of mineral development activities, adequacy of mitigative measures (i.e. reclamation) and accuracy of impact predictions. Detection of changes that exceed the maximum acceptable level or threshold (as determined by the regulatory agency or agencies) would trigger a mitigation response plan. This plan can be developed for expected short-term and continuous or long-term impacts, as well as unpredictable impacts.

The timing and location of unpredictable impacts, such as a hazardous material spill, are unknown, so a monitoring program is not feasible. However, implementation of a pre-determined mitigation response plan to contain, neutralize, and clean up the impacted area is necessary. A follow-up assessment of biological impact, reclamation, and replacement could then be implemented. The Alaska Department of Environmental Conservation has prepared a hazardous material spill contingency plan which would be invoked should a spill occur.

Because this EIS will be the "overarching" description of general mitigation, it would be impractical to identify the entire spectrum of potential mitigative measures. As stated previously, specific mitigation depends on many factors such as elevation, geology, soil and slope and the resource which requires protection. Therefore, mitigation is better described and analyzed in site-specific EAs. For examples of site-specific mitigation measures see EAs on McClain (DOI 1988a) and Alaska Placer Development (DOI 1988b). These two operators were granted Limited Intervenor status by the District Court based in part on the data supplied in those assessments.

Figures 4-11, 12, and 13 summarize potential mitigation measures which could be used to avoid, minimize, rectify, or replace resources impacted by placer mining activities. The break down mining activities into three separate components: access, facilities, and operations; present a framework for mitigation of affects associated with these components, and evaluate the effectiveness of the mitigation measures.

ACCESS — Potential Mitigation Measures	Effectiveness
Locate crucial/sensitive areas and plan alignments to avoid those areas. eg: (a) Refer to RMPs, other plans for location, analyze in EAs and Plans of Operation, realign access, (b) identify archaeological sites/areas for potential nomination as NRHP sites and mitigate avoidance or recovery of artifacts (i.e. do a "dig"), (c) design low water crossings, dikes, dams, bridges to minimize impacts to sensitive areas.	Would avoid or minimize physical alterations, disturbance/disruption of some crucial/sensitive areas.
Alter timing, use, location, extent and design of access. eg: (a) Visual quality assessment conducted as appropriate, (b) disallow overland access except in winter; (c) seasonal stipulation, alter use of area of crucial habitat requirements, (d) use erosion-resistent materials for access road surfacing/maint.	Would avoid or minimize disturbance/disruption of visually and environmentally sensitive areas such as caribou migration routes.
Monitor road/trail use, impacts and incorporate into decision-making. eg: (a) Stipulate seasonal limitations/number of users via permit; (b) refer to existing RMPs, MFPs, EAs, for stipulations mitigation measures.	Would provide information about effectiveness of mitigation, accuracy of impact predictions and numbers of users.
Coordinate with other adjacent land management and regulatory agencies that could be impacted by the proposed placer mining activity. eg: (a) Conduct pre-work inspection on site with appropriate representatives from other impacted agencies to ensure all concerns are addressed; (b) establish inter-agency review process. ("one-stop shop")	Would keep other agencies, land managers, owners informed of land use activities.
Conduct class III Cultural Resources inventories. eg: (a) Conduct a professional field exam and testing of the area of impact; (b) Conduct a full scale archaeological dig on selected sites.	Would provide better baseline cultural data.

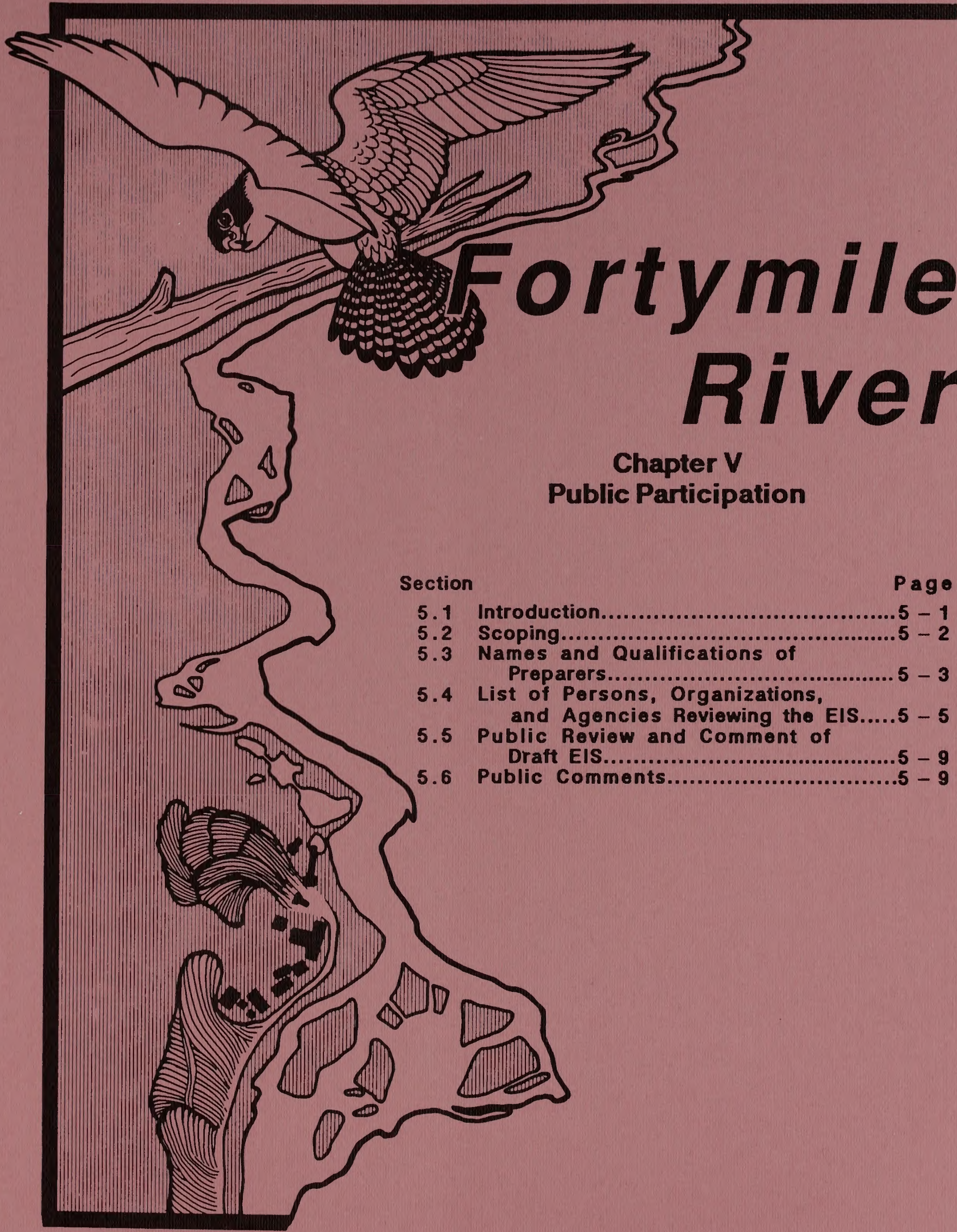
Figure 4-11. Potential Mitigation Measures on Placer Mining Access Impacts.

FACILITIES — Potential Mitigation Measures	Effectiveness
Locate crucial/sensitive areas and plan facility locations to avoid those areas. eg: (a) Develop site specific EAs on Plans of operations, which identify and adjust facility location, (b) relocate ancillary facilities to reduce potential visual impacts, (c) relocate ancillary facilities to avoid impacts on environmentally sensitive areas. (d) Relocate ancillary facilities to avoid impacts on archaeological sites, etc.	Would avoid or minimize physical alteration, disturbance/disruption of identified crucial/sensitive areas.
Alter timing, location, design and extent of facility use, depending on site specific EA and Plan of operations analyze facilities to reduce impacts to wildlife, water and recreation eg: (a) Use earth tone paints on facilities to minimize visual impacts; (b) apply seasonal stipulations for facility use to avoid impacts on crucial/sensitive areas.	Would avoid or minimize disturbance/disruption of wildlife, fisheries, recreation, and water resources.
Monitor use of facilities, impacts and incorporate into decision-making during compliance examinations.	Would provide information about effectiveness of mitigation and accuracy of impact predictions.

Figure 4-12. Potential Mitigation Measures on Placer Mining Facility Impacts.

OPERATIONS Potential Mitigation Measures	Effectiveness
Locate crucial/sensitive areas and plan operation locations to avoid those areas. eg: (a) Use low level aerial photography as a tool to identify potential sensitive areas requiring avoidance. (b)Mark (on the ground with pin flags) areas to be avoided.	Would avoid or minimize physical alterations disturbance/disruption of some crucial/sensitive areas.
Alter iming, location, design, extent of operation activities. eg: (a)Construction of stream bypass during low water season. (b)Identify optimum location for bypass channel to avoid impacts to crucial/sensitive areas, areas of potential archaeological resources, areas subject to subsidence/slumping/slope failure. (c)Design shortest possible bypass to reduce stream gradient/ velocity in order to minimize erosion.	Would avoid or minimize disturbance/disruption of some crucial/ sensitive areas.
Monitor overall operations, impacts and incorporate into decision-making. eg: (a)Conduct multiple compliance inspections during field season to ensure adherence to plan of operation (number and frequency of Compliance Examinations is directly dependent upon area sensitivity). (b)Require water sampling.	Would provide information about effectiveness of mitigation and accuracy of impact predictions.
Reclaim/replace by sloping, respreading fines and topsoil (when available), natural succession.	Would restore 15-60% of land-cover, habitat in 30-50 years.
Reclaim/replace by stabilization to prevent erosion, natural succession. eg: Require placement of water bars/water traps every 75 feet on the contour to reduce sheet flow velocity and entrap sediment.	Would restore 15-25% of land-cover, habitat in 50 years.
Reclaim/replace by shaping, respreading fines and topsoil; fertilize and/or reseed with native species when appropriate. eg: (a)Leave patches or strips of original native vegetation in area of operations to serve as source of seeds and propagules. (b)Introduce beaver into stream valley after cessation of mining. Beaver activities help to reestablish pools and meanders in stream, serve as large catchment ponds to retain organic and other fine grained materials, dams serve as areas where shrub shoots take root to grow, cyclic nature of beaver colonies assists in reestablishment of natural diversity. (dams may cause blockage of fish migrations)	Would stabilize soil and restore 50-60% of landcover, habitat in 25-35 years.
Reclaim/replace by shaping, respreading fines and topsoil, fertilize and/or reseed with native plants. eg: Replant some of reclaimed area with willow shoots 1-2 feet tall. Especially effective near land/water interface. Plant shoots in patchy pattern to approximate original vegetation pattern and diversity.	Would stabilize soil and restore 50-60% of landcover, habitat in 5-15 years.
Reestablish stream channel in original location. Approximate pre-mining length, flow velocity hydaulic gradient, and cross-sectional configuration.	Restore fish habitat, reduce Non-Point erosion, improve visual quality, reduce off-site impacts on stream system.
Zero discharge/100% recycle. eg: Disallow discharge of any process water.	Minimize effects of sedimentation, changes to water chemistry caused by placer mining.

Figure 4-13. Potential Mitigation Measures on Placer Mining Operation Impacts.



Fortymile River

Chapter V
Public Participation

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5.1 Introduction

The BLM conducted a broad public and interagency consultation program throughout the development of this EIS, and this input has been incorporated throughout the analysis and document preparation phases. Consultation, coordination, and public involvement have occurred throughout the EIS process through public meetings, informal meetings, contacts with individuals and interest groups, agency meetings and briefings, news releases, and a Federal Register notice.

A public participation plan was prepared to ensure that the public would have numerous opportunities to be actively involved. Both formal and informal input have been encouraged and used. A mailing list was prepared and maintained during the project (see Section 5.4).

Coordination with other agencies and consistency with other plans were accomplished through frequent communications and cooperative efforts between the BLM and involved federal and state agencies and organizations.

The State of Alaska Departments of Fish and Game (ADF&G), Natural Resources (ADNR) and Environmental Conservation (ADEC) were sent several copies of the Draft EIS for their review to ensure consistency with State laws, programs, and regulations.

Consultation and Coordination

Members of the EIS team have consulted both formally or informally with numerous agencies, organizations, private companies, and individuals who have indicated an interest in the Fortymile River Draft Cumulative EIS.

The National Park Service (NPS) is conducting a cumulative study similar to the BLM effort. Several meetings were held to exchange information and ideas regarding these efforts. The NPS and BLM approached the issues of a cumulative EIS in a somewhat different manner due to their different management responsibilities.

The U.S. Army Corps of Engineers is cooperating with BLM in this EIS. There has been a useful exchange of information between the two agencies.

The U.S. Fish and Wildlife Service was solicited for information regarding any listed or candidate threatened and endangered species that may be present in the Fortymile River drainage. Informal consultation determined that no listed or candidate endangered, or threatened species would be affected.

Several meetings were held with EPA to deal with technical aspects of water quality; these produced information to refine the water quality efforts, this led to several contracts with State of Alaska agencies to assist BLM in data acquisition and analysis.

Meetings and briefings were conducted with the State of Alaska, including the Departments of Fish and Game, Environmental Conservation, Natural Resources, and Office of Management and Budget.

In addition to numerous meetings to gather data on resources and programs, the State of Alaska collected data and provided interpretation in several contractual reports (Appendix A-1). These reports included the topics of water quality, aquatic habitat and fisheries, biologic information, and a review of other consultant reports. Also, information researched by the State of Alaska on subsistence usage was utilized.

Meetings were conducted with the U.S. Bureau of Mines, ADNR, and the U.S. Geological Survey to update BLM on mineral resources and geology within the study area.

5.2 Scoping

The scoping process conducted by the BLM provided an opportunity for members of the public, special interest groups, the mining industry, and other agencies to assist in defining significant environmental issues. The main objectives of the scoping meetings were:

- To present an overview of this EIS.
- To identify the major environmental issues to be addressed in this EIS.
- To receive comments and questions regarding environmental impact concerns.
- To incorporate those comments and questions into the EIS planning process.

Initially more than 450 letters were sent to the public requesting comments, issues, and concerns to help in setting the parameters of the study, and in developing a mailing list.

The scoping process was initiated for this EIS with the publication of a Notice of Intent to prepare an EIS in the Federal Register on August 18, 1987. The scoping meetings were also announced in local papers and on radio stations throughout the Fairbanks area, in remote communities, and in Anchorage. These announcements resulted in formal meetings in Central, Livengood, Chicken, Fairbanks, Anchorage, and Minto, which were attended by various publics and agencies.

Additionally, a total of 32 written comments were received during scoping (August 18 - October 20, 1987) and concerns were organized into general areas of concern for further evaluation.

Copies of these comments, as well as tapes of later scoping meetings are available at the BLM Alaska State Office, 701 C Street, Box 13, Anchorage, Alaska 99513. The general areas of concern cited in public response letters were subsistence, NEPA requirements, reclamation, recreation, water quality, sedimentation, fish and wildlife habitat, economics, legal considerations, research, and engineering. All concerns identified during the scoping process were carefully considered during the development of this EIS.

5.3 Names and Qualifications of Preparers

Both the Draft and Final EIS documents for the Fortymile River drainage were prepared by an interdisciplinary team of specialists from the Steese/White Mountains and Kobuk District Offices and the Alaska State Office of the BLM. Reviews for accuracy and consistency were provided by the District and State Office staffs as well as key personnel of the U.S. Army Corps of Engineers, Alaska District.

Lynn Anderson, Outdoor Recreation Planner, Bachelor of Science - Outdoor Recreation, 1980, Colorado State University. Four years with BLM, two years with the Forest Service.

Carol Belenski, Visual Information Specialist for seven years. Mapping specialist and printing coordinator for numerous plans.

Kent F. Biddulph, Landscape Architect/Environmental Planning, Bachelor of Arts, 1964, Utah State University, 21 years in Landscape Architecture - Visual Resource Management and Recreation Planning.

Frank Bruno, Writer/Editor, Bachelor of Arts - Journalism, 1974, San Jose State University. Five years with BLM.

Robert C. Burritt, Natural Resource Specialist. Thirteen years experience with BLM Alaska Fire Management, eight years experience as Natural Resource Specialist; fourteen years of local experience in the Fortymile drainage.

Louis Carufel, District Fisheries Biologist, Bachelor of Science - Biology, 1948, St. John's University - Minnesota; Master of Science - Fish and Wildlife Management, 1960, Montana State University. Twenty years of federal service.

Ed Collazzi, Hydrologist, Alaska Dept. of Natural Resources, Bachelor of Arts - Geography, 1979, University of California, Los Angeles. Seven years experience in Hydrology with the State of Alaska.

Lee Douthit, Subsistence Coordinator, Bachelor of Arts - History, 1967, Texas Woman's University; Master of Arts - Anthropology, 1976, University of Texas at Austin; Ph.D. - Anthropology, 1978, University of Texas at Austin. Seven years with BLM as a Research Archaeologist, cultural resource manager, and subsistence coordinator.

Linda Du Lac, Land Law Examiner, Bachelor of Science - Resource and Recreation Management, 1974, Oregon State University. Nine years with the Forest Service and four years with BLM.

Bruce Durtsche, District Wildlife Biologist, Bachelor of Science - Wildlife Biology, 1978, Arizona State University. Twelve years with BLM. Three years with the State of Arizona.

Richard F. Dworsky, Project Manager, Bachelor of Science - Forestry, 1965, University of Michigan; Masters in Science - Recreation, 1972, Colorado State University; Ph.D. - Forestry, 1986, University of Massachusetts. 20 years in natural resources planning and management. Former Chief of Forestry in Puerto Rico.

William S. Hauser, Mining Engineer, Bachelor of Science - Mining Engineering, 1977, Virginia Polytechnic Institute and State University. 10 years federal service.

Ronald G. Huntsinger, Physical Scientist, Bachelor of Arts - Biology, 1972, Humboldt State University; Graduate studies - Hydraulic Engineering and Watershed Management, Humboldt State University. Fifteen years experience in hydrology, watershed management, aquatic sciences, and undergraduate instruction in biology and physics.

Robert E. King, Anthropologist, Bachelor of Arts - History, 1970, Washington State University; Bachelor of Arts - Anthropology/Archaeology, 1970, Washington State University; Master of Arts - Anthropology/Historical Archaeology, 1973, University of Pennsylvania; Ph.D. - Anthropology/Ethnohistory, 1978, University of Pennsylvania. Six years with BLM. One year Anthropology contract work. Two years author, historian.

Paula V. Krebs, Geographic Information Systems Coordinator, Bachelor of Arts - Zoology, 1965, University of Colorado; Ph.D. - Plant Ecology, 1972, University of Colorado. 22 years experience in landcover/vegetation data production, applied plant ecology projects, ecological analysis and vegetative mapping, and graduate/undergraduate instruction in Botany and Resource Management.

Howard Levine, Technical Coordinator, Bachelor of Arts - Geography, 1981, San Diego State University. Seven years with BLM.

Thomas C. Mowatt, Geologist, Bachelor of Arts, 1959, Rutgers University; Ph.D., 1965, University of Montana. Twenty-five years professional experience in geology, geochemistry, chemistry, and environmental sciences. Includes private sector research and energy/mineral resources exploration-development-production, university teaching-research, state and federal government work. Active professionally in Alaska since 1970.

KJ Mushovic, Land Law Examiner, Associate Degree - Mining Engineering, 1981, Penn State. Five years with BLM.

Kim Pearce, Illustrator, Bachelor of Science, major - Illustration, minor - Biology, 1986. Nazareth College of Rochester, New York. Two years with BLM.

Jacob Schlapfer, Land Use Planner, Bachelor of Science - Biology, 1987, Western Oregon State College. One year with the U.S. Forest Service. Two years with the U.S. Fish and Wildlife Service.

Page Spencer, Project Manager, Bachelor of Science - Biology, 1972, University of Alaska - Fairbanks; Masters of Arts - Ecology, 1975, University of Colorado; Ph.D. - Plant Ecology, 1981, University of Alaska, Fairbanks.

John Thompson, Environmental Coordinator, Bachelor of Science - Economics and Political Science, 1975, Dakota State University; Master of Science - Agricultural Economics, 1977, Purdue University. Employed by BLM 1977 to present.

Dave Vogler, Hydrologist, Bachelor of Science - Watershed Science (Hydrology), 1978, Colorado State University. Ten years subsequent professional experience in hydrology.

Susan M. Will, Archaeologist, Steese-White Mountains District, Bachelor of Arts, 1975, University of Alaska at Fairbanks. Nine years with Bureau of Land Management.

Support Personnel

Mike Clark, Cartographic Technician

Debbie Llacuna, Secretary

Charles Luddington, Photolithographer

Linda Mowatt, Miscellaneous Documents Clerk

Betty Ostby, Land Law Assistant

Aaron Ritchins, Cartographic Technician

Paul Schlepler, Clerk/Typist

5.4 List of Persons, Organizations, and Agencies Reviewing the EIS.

Alaska Congressional Delegation

Frank Murkowski
Ted Stevens
Don Young

Alaska State Government

Alaska Dept. of Commerce and Economic Development
Alaska Dept. of Environmental Conservation

Alaska Dept. of Fish and Game
Alaska Dept. of Law
Alaska Dept. of Natural Resources
Alaska Dept. of Transportation and Public Facilities
Alaska Division of Governmental Coordination
Alaska Governor's Office
Alaska Land Use Council
Anchorage District Recording Office
Fairbanks District Recording Office
Fairbanks North Star Borough
Honorable John B. Coghill
Office of the Attorney General
University of Alaska - Anchorage
University of Alaska - Fairbanks

U.S. Government

Assistant Secretary of the Air Force
Department of Energy
National Park Service
Office of Environmental Planning
Office of Environmental Project Review
U.S. Bureau of Indian Affairs
U.S. Bureau of Land Management
U.S. Bureau of Mines
U.S. Bureau of Reclamation
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish & Wildlife Service
U.S. Geological Survey
U.S. Forest Service
Secretary of the Army

Organizations

Alaska Center for the Environment
Alaska Federation of Natives
Alaska Legal Services
Alaska Miners Association
Alaska Oil and Gas Association
Alaska Outdoor Council
Alaska Women in Mining
Arctic Audubon Society
Audubon Society
Bering Straits Coastal Management Program

Birch Creek Council
Canada Fisheries and Oceans
Circle District Historical Society
Citizen's Adv. Commission on Federal Areas
Conservation Foundation
Denali Citizens Council
Fortymile Placers
Klondike Placer Miners Association
Mountain State Legal Foundation
Northern Alaska Environmental Center
Pacific Fishery Management Council
Pacific Legal Foundation
Placer Miners of Alaska
Resource Association of Alaska
Sierra Club, Alaska Chapter
Sierra Club Legal Defense Fund
Tanana Chiefs Conference
Trustees for Alaska
The Wilderness Society

Businesses

Alaska Biological Research, Inc.
Alaska Gold Company
Alloy Welding & Machine
Alyeska Oil & Exploration
AMAX
American Rivers
Apocalypse Design, Inc.
Arctic Grayling Guide Service
BTW Mining and Exploration
Bean Ridge Corporation
Beaver Kwit'chin Corporation
Besco, Inc.
Billiton Minerals
Black Velvet Mining
Canada Tungsten Mining Corporation
Clem's Backpacking Sports
Danzhit Hanlaii Corporation
Dickstein, Shapiro & Morin
Dinyee
Dot Lake Native Corporation
Dowl Engineering
Doyon, Limited
Entech, Inc.

Environlab
Environmental Services, Ltd.
Exxon
Fairbanks Exploration
Fraley Equipment, Inc.
George Miller Construction, Inc.
Hart Crowser
Homestake Mining Company
Hungwitchin Corporation
Kachemak Mining Company
Kantishna Mining Company
Knik Kanoers & Kayakers
L.A. Peterson & Associates
Little Squaw Gold Mining Company
Michael Gaughan & Associates
Nerco Minerals Company
Northland Minerals
Parsons, Bahle, Latimer
Ray Wolf Mining
Rife & McMillan
Robertson Mining Company
Russell/Norton/Drovin
SAPCO
Saupe' Enterprises
Seth-de-ya-ha Corporation
T.C.C.
Tanacross, Inc.
Tihteet'Aii, Inc.
Tozitna, Limited
U.S. Borax
Usibelli Coal Mine, Inc.
Warwick & Schikora
WGM, Inc.
Westours
Yukon Quest International, Ltd.

Libraries & Newspapers

Alaska State Library
Alaska Resources Library
Colorado State University Library
Copperas Cove High School Library
Elmer E. Rasmuson Library
Natural Resources Library
Noel Wien Library

Southern Oregon State College
Tundra Times
University of Alaska Library - Anchorage
Z.J. Loussac Public Library

375 Individuals

5.5 Public Review and Comment of Draft EIS

A Notice of Availability was published in the Federal Register on June 10, 1988 (53 FR 21914) for the Fortymile River Draft EIS. Over 800 copies of the Draft EIS were distributed to agencies, groups, and individuals. A total of three public meetings were held in conjunction with this EIS in Anchorage, Fairbanks, and Chicken. The Draft EIS was available for review and public comment from June 13 to August 12, 1988. This allowed the minimum required 45-day period for public comments.

During the comment period, 78 written comments were received in response to the Draft EIS from various government agencies, including the State of Alaska Governor's Office, private corporations, special interest groups, and members of the public.

5.6 Public Comments

All comment letters received by the end of the comment period have been reprinted in the following section. Responses to the letters are numbered next to the specific comment paragraph (e.g., response 21-13 responds to letter 21, topic or paragraph 13). For accuracy and cost-efficiency, all letters have been reprinted in their original form. The originals are available for review at the BLM Alaska State Office, Office of Management, Planning, and Budget.

All discussion from the public meetings was electronically recorded. Some of these discussions have been transcribed. Tapes of the meetings and unedited transcripts are in the project files. Most issues and concerns raised in the meetings were also addressed in the written comments, and are responded to in the written responses.

We thank everyone who took the time to comment on the Draft EIS. All comments (both oral and written) were considered during our review according to the requirements found in 43 CFR 1503.4(b). Some comments required a clarification of the information in the Draft EIS and that information is presented in the responses to the comments. In some cases, text modifications were made as a result of those comments. Other comments pointed out needed changes in the text, and those changes were made. There are no specific responses to comments which did not provide either a clarification, correction, or modification in the text. Written and oral commenters and the issues they raised are provided in Figures 5-1 and 5-2.

	INDIVIDUAL PREFERENCE FOR-			ISSUES AND CONCERNS																	
	PROPOSED ACTION	ALT C	ALT D	W.Q.	COMPL.	WL.	LC.	FISH	ECON	REC.	SUBST.	E.C.	C.P.	VIS.	M.R.	C.R.	RECL.	WTLDS.	W.C.	FLD.	BOND.
COMMENTORS																					
FORTYMILE MINING DISTRICT	ALT A																				
KEN ZAFREN		X																			
TANANA VAL. SPORT. ASSOC.						X	X														
MR. JOHNSON		X																			
MARK R. JOHNSTON				X						X											
BOB BARCUS		X		X																	
JANET HUEBNER		X																			
ROBIN HAMMAND	X			X		X		X													
JAN SWEDO		X																			
WALTER & DORTHY PELECH		X		X																	
ELEANOR MACLELLAN		X		X																	
LAKETTE LEIN				X						X	X										
RICH JONES			X																		
G.M. ZEMANSKY																	X				
CHARLIE OTT			X																		
ROBIN WILSON		X																			
BUREAU OF MINES (DOI)				X											X						
DEPT. NATURAL RES.																X					
TOM COPE		X		X																	
LES MAXWELL	ALT A								X	X											
DONALD PENDERGRAST		X		X	X												X				
JAKE SCHWARTZ		X		X	X																
MICHEAL SPINDLER		X		X	X			X						X							
R.A. APPEL		X			X																
DAVE LACEY (DINYEE)		X		X							X										
DICK HAMMAND	ALT A																				
ERIC & ALVIN KILE	ALT A																				
JOE VAN HORN		X		X	X																
SUE KELLER		X		X	X		X	X													
MR & MRS COLE		X		X			X				X										
MR SCRUGGER												X									
SANDRA CARNES			X																		
MR. & MRS. M. GOTTLIEB				X	X																
JOHN BURNS	X			X		X	X		X	X											
G.A. HANKS & SON				X																	
DAVE & DIANE KUKOWSKI						X	X		X	X											
WILLIAM WALTERS		X		X	X																
CLYDE MILES						X											X				
EPA				X	X	X	X	X	X	X	X				X			X			
STATE OF ALASKA				X	X	X	X	X		X	X	X				X	X	X			
BRETT MURPHY				X		X	X	X					X								
EARL SCHENE				X																	
MR. & MRS DAVID PEARSON								X				X	X	X							
JIM STRATTON		X		X	X																
AK. MINERS ASSOC.	X			X		X							X								
PACIFIC LEGAL FOUNDATION	X			X		X	X	X	X	X	X	X			X						
SIERRA CLUB LEGAL DEF.		X		X	X	X		X	X		X	X	X	X		X	X		X	X	X
SIERRA CLUB (AFO)		X		X	X				X		X	X				X	X				
HARRY WILSON			X																		
DAVID WILSON		X		X	X												X				
MARY ZALAR		X																		X	
CITIZENS ADVISORY COMM.	X				X				X								X				
FRED HEFLINGER	X					X			X												
LARRY & JUNE TAYLOR				X		X		X	X	X			X	X			X				
JOSEPH & MONA MITCHELL												X	X								
JAMES DEVIVE				X									X				X				
NATIONAL PARK SERVICE				X							X			X	X	X			X		
DANIEL DRAPER				X		X	X	X		X											
NORTH. AK. ENVIRON. CEN.		X		X	X	X	X	X		X	X	X					X				
MICHAEL BUSBY	X			X		X	X			X		X		X			X				
WAYNE MACMORRAY				X					X												
JOHN TURNER				X					X		X	X	X								
JOHN & DIANE GOEKE		X		X	X																

KEY FOR ABBREVIATIONS -

BOND. - BONDING
COMPL. - COMPLIANCE
C.P. - CAMPING PERMITS
C.R. - CULTURAL RESOURCES
E.C. - EDITORIAL COMMENTS

ECON - ECONOMICS
FISH - FISHERIES
FLD. - FLOODING
LC. - LANDCOVER
M.R. - MINERAL RESOURCES

REC. - RECREATION
RECL. - RECLAMATION
SUBST. - SUBSISTENCE
VIS. - VISUAL
W.C. - WORST-CASE

WL. - WILDLIFE
WTLDS. - WETLANDS
W.Q. - WATER QUALITY

Figure 5-1. Written commenters and areas of concern matrix.

	ISSUES AND CONCERNS															
	ECON.	W.Q.	SUBST.	L.C.	WL.	FISH.	REC.	VIS.	COMPL.	FLD.	WTLDS.	C.R.	E.C.	W.C.	C.P.	S.D.
COMMENTORS -																
ANCHORAGE MEETING: 9																
JERRY PRZYBYLA	X	X										X				
EMILEY BARNETT (SIERRA CLUB)		X		X	X	X		X	X		X			X	X	X
RICHARD OGAR	X								X							
FAIRBANKS MEETTING: 19																
JOSH MOORE		X	X	X												
DON MAY	X															
ROGER BURGRAFF	X		X													
CHICKEN MEETING : 34																
DAVID LIKINS	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X
LARRY TAYLOR	X			X	X				X							X
JUNE TAYLOR	X							X								X
JOHN TURNER	X								X					X	X	
MICHAEL O'GORMAN							X									
DICK HAMMOND	X			X					X							
ROBIN HAMMOND				X	X				X							
GREG SADDER				X	X		X	X								
MICHAEL BUSBY		X		X	X		X		X							
WILLIAM BAYLESS					X											
MARK BEEMAN	X						X	X								
BILL CROWLY																
STEVE MOORE																
DANNY DRAPER																
MIKE STRANG																
BRETT MURPHY																
MARK BREECE	X	X	X	X	X	X	X	X	X		X		X	X	X	X

KEY FOR ABBREVIATIONS -

COMPL. = COMPLIANCE
C.P. = CAMPING PERMITS
C.R. = CULTURAL RESOURCES
E.C = EDITORIAL COMMENTS
ECON. = ECONOMICS
FISH = FISHERIES
FLD. =.FLOODING
L.C. = LANDCOVER
REC. = RECREATION
S.D. = SUCTION DREDGERS
SUBST. = SUBSISTENCE
VIS. = VISUAL
W.C. = WORST CASE
WL. = WILDLIFE
WTLDS. = WETLANDS
W.Q. = WATER QUALITY

Figure 5-2. Oral commenters and areas of concern matrix.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Steese/White Mountains District Office
1541 Gaffney Road
Fairbanks, Alaska 99703-1399

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
1784 (975E)

May 19, 1988

To: Michael J. Penfold (910)

From: Donald E. Runberg, District Manager (080)

Subject: Joint Resolutions of the Northern and Southern Advisory Councils

Attached are the eight resolutions addressed by the Advisory Councils at their joint meeting on May 10 and 11. All were passed by both councils except number 3, which was withdrawn before a vote.

Since several of these resolutions request action at the state office level or higher, I am forwarding them to you for consideration and action.

The minutes are being prepared and will be forwarded to you by June 8.

Donald E. Runberg

1 Attachment
Attch 1 - Joint Resolutions (8 pp)

cc: Gene Terland, Acting DDM/Southern Council
John Rumps, DDM/Southern Council
Bob Arwezan, Acting Chair/Southern Council
Hope Nelson, Chair/Southern Council
June Degnan, Vice-Chair/Southern Council
Woodrow Johansen, Chair/Northern Council
Gary Lee, Vice-Chair/Northern Council

Resolution from
the Joint Meeting
of the
Northern & Southern Alaska Advisory Councils
May 10 & 11, 1988
Fairbanks, Alaska

#4 - Resolution drafted by John Sims — Passed/both Councils

WHEREAS, the BLM has been required by the U.S. District Court (District of Alaska) to prepare cumulative environmental impact statements assessing the impacts of placer mining on the Beaver Creek, Birch Creek, Fortymile River and Minto Flats drainages; and

WHEREAS, the draft cumulative EISs for the Beaver Creek and Birch Creek watersheds have recently been released; and

WHEREAS, the "proposed action" (i.e., preferred action) identified in the draft cumulative EISs allows for placer mining to occur within a framework of appropriate and adequate protection of the environment; and

WHEREAS, the "proposed action" recognizes that placer mining is a needed and valuable economic activity on the public lands; therefore

Be it resolved that the Northern and Southern Alaska Advisory Councils commend the professional staff of the BLM for the timely completion of the EIS drafts which thoroughly address the charges of the court.

Be it further resolved that the Northern and Southern Advisory Councils hereby endorse the preferred alternative identified in the draft cumulative EISs for Beaver and Birch creek watersheds.

Attch 1-4

1 Continued

We as miners of the
Forty Mile Minning District
Support
Alternative "A"

BLM AK SO 950
JUN 15 1 54 PM '88

10181 Curvi St.
Anchorage, AK 99516
16 June 1988

Fortymile River EIS
c/o Richard Dworsky
Bureau of Land Management
701 C St. Box 13
Anchorage, AK 99513

I am writing in support of alternative C. This alternative provides the best balance between protection of the environment and cost to the federal government. Clearly, placer mining is a very minor economic activity in Alaska, especially when viewed in light of potential environmental impacts. The federal government should neither be in the business of buying up claims nor of allowing any unnecessary degradation of environmental quality.

Sincerely,

Ken Zafren

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS ALASKAN AIR COMMAND
ELMENDORF AIR FORCE BASE, ALASKA 99506-5001

23 JUN 1988

REPLY TO ATTN OF: DEP

SUBJECT: Fortymile River EIS

TO: Fortymile River EIS
Mr Richard Dworsky
BLM
701 C Street, Box 13
Anchorage AK 99513

The Alaskan Air Command has reviewed the subject document and offers no comments. We have no land interests in the study area.

Amy Wickstrom

AMY WICKSTROM
Director of Programs

1 Atch
Fortymile River Draft EIS

Top Cover for North America

Tanana Valley Sportsmen's Association
INCORPORATED
P.O. Box 669 Fairbanks, Alaska 99707 Phone 479-3367

WP

Michael J. Penfold, Director
Alaska State Office, Bureau of Land Management
701 C St., Box 13
Anchorage, Alaska 99513

6/28/88

Dear Mr Penfold,

The Tanana Valley Sportsmen's Association is very impressed with the timely and intensive production of the Beaver Creek, Birch Creek, and Forty Mile Draft Cumulative Environmental Impact Statements. We wish to offer comments on all three statements, and on the Minto Flats Statement that is yet to come.

The documents portray the changes in the land associated with placer mining in what reads to be an exclusively negative fashion. We suggest that the word `destruction' be used with great care, if at all. There is no question that following the completion of placer mining, or for that matter a BLM prescribed burn, the environment is changed. But for BLM to editorialize this change and characterize it as destruction is not accurate, not appropriate, and unsupportable with the facts.

BLM AK SO 974A
JUN 30 2 10 PM '88

In the more than 50 years that TVSA has been involved in wildlife management, we have supported many habitat enhancement programs, these include prescribed burns,

mulching (often with a bulldozer) willows more than ten years old to create new and more productive growth, and the construction of ponds for waterfowl loafing and nesting habitat. It is clear that placer mining, especially modern mining with hydraulic bulldozers can achieve much of the same effect.

The goal of habitat enhancement programs is to increase the diversity of the available habitat. Younger successional stages of plants then are intermixed with the surrounding older, and, for many species, less productive habitat.

TVSA actively opposed the BLM fire supression policy created after WW II, and supported the statewide Interagency Fire Management Plan in effect today. It is the opinion of TVSA and many others that the total fire supression plan of BLM greatly reduced the diversity of the natural habitat in Interior Alaska. Placer mining can recreate a very small portion of that diversity and this should be clearly stated in the EIS documents. 5-1

Placer mined areas that have naturally revegetated contain a higher number of beaver. Beaver is a lower trophic level species, they help support populations of wolverines, wolves, otter, bear and other predators. Their ponds, along with ponds left by miners (unless BLM requires

5 Continued

them to be obliterated) are of value to waterfowl, muskrat and some species of fish. Beaver is an easily measured environmental barometer indicative of the positive impacts that mans presence can have upon the environment.

TVSA is most concerned that BLM is adopting, without fact or justification, the popular eco-theology that man is the nexus of all that is destructive and evil in the world. Please change the tone and balance of your final document to reflect changes as changes, not destruction. Please take some time to explain that the most productive portions of the succession that occurs after mining is within the first few years, not the 100 or more years included in your graph on p. 4-19 (Beaver Creek).

In summary we believe that BLM needs to recognize the difference between the impacts of modern mining with bulldozers, and the impact accountable to the deposition of washed coarse rock from the dredges of a bygone era. BLM should also encourage miners to leave behind ponds, either as depressions below the watertable or as dammed settling ponds, for the benefit of waterfowl. The creation of these ponds might, in a small way, compense for the irresponsible manner in which the Department of the Interior has ignored its obligations under the Migratory Bird Treaty (USC 86-3657, Outdoor Council vs. Dunkel).

5 Continued

When natural and man-caused environmental changes are objectively examined wildfire, floods, natural erosion, long-term climatic changes, highway construction, gravel extraction, agricultural development, residential development, over hunting, over fishing, and lack of compliance with accepted conservation principles are all of greater environmental impact than properly regulated placer mining.

Sincerely Yours,

Bud Burris

Oliver "Bud" Burris

Wildlife Biologist,

Co-Chairman, Legislative Affairs Committee

5 Continued

5-1 See revised text, Section 4.6.6, Short-Term Uses vs Long-Term Productivity.

FAIRBANKS
HUB OF THE INTERIOR

Greater Fairbanks **Chamber** of Commerce

First National Center | P.O. Box 74446
709 Second Avenue | (907) 452-1105 | Fairbanks, Alaska 99707

RESOLUTION #25-0688

RESOLUTION SUPPORTING BLM E.I.S. PROPOSED ACTION
ON FORTYMILE RIVER PLACER MINING OPERATIONS

WHEREAS, the BLM studies were prepared by qualified professionals, with input from competent government agencies and civilian firms, and

WHEREAS, the BLM should be commended for the thorough analysis and evaluation of the environment and placer mining activities in the study areas, and

WHEREAS, the economic impact of placer mining on the Fairbanks economy is substantial, (placer mining contributed about $46 million in sales, $9.5 million in salaries and wages of about 625 full-time employees in 1985) and

WHEREAS, the proposed action recommended by BLM is to continue management of mining claims on Federal lands as done in 1987, which required reclamation of mining areas and meeting current EPA affluent guidelines and ADEC water quality standards, or the existing EPA/ADEC variance for the operation, and

WHEREAS, alternatives to the proposed action would impose increasingly stringent standards, ultimately disapproving any new applications for mining, and

WHEREAS, the BLM estimates that under the proposed action the economic benefits to Fairbanks from placer mining in the three study areas would increase by 23% in the coming decade, with the largest proportion from the Birch Creek district, and

WHEREAS, there would be considerably less increases under Alternatives A and B, and declines under Alternatives C and D, and

WHEREAS, the environmental impacts from the proposed action would be least in the Beaver Creek drainage and greatest in the Birch Creek district, and

WHEREAS, an increase from the present 30 mines to 37 (20 Federal and 17 state and private mines) would result in long-term loss of vegetation cover on more than 600 acres, and disturbance of more than 3000 acres of wildlife habitat. Long-term impacts on habitat would probably contribute to a minimal reduction in moose population potential. As village-based subsistence usage of the Fortymile River drainage is relatively limited, mining under any of the alternatives would not be disruptive to these users:

July 3, 1988

Dear Mr. Dworsky,

I note that placer mining is severly damaging Alaskan scenic river scenic river systems. These include Birch Creek, Fortymile River, Beaver Creek and the Minto Flats drainage. Yet your EISs all downplay the deadly effects of placer mining here.

Protection should be your primary concern; not mining. I like Alternative "C" for protection of water quality applied to all the wild and scenic rivers. In fact I advocate a No Mining policy, which is the only recourse if your Alternative "C" doesn't protect mandated resource values.

You and your staff have worked hard on the EISs but you've been unable to withstand mining pressures. Please be more protective. In the meantime you have my good wishes. I care.

Concerned citizen

Norman Ritchason

July 5, 1988

Richard Dworsky
Bureau of Land Management
701 C St., Box 13
Anchorage, Alaska 99513

Dear Mr. Dworsky:

I'm writing in response to the environmental impact statements for the Beaver Creek, Birch Creek, and Fortymile River watersheds which were recently released by the Bureau of Land Management. As you know, Birch Creek is in the Steese National Conservation Area and Beaver Creek is in the White Mountains National Recreation Area, while all three are designated wild and scenic rivers. The conservation and recreation units as well as the wild and scenic designations carry with them mandates that they be managed to preserve and protect various qualities. In my opinion, the proposed actions within the EIS's fall far short of living up to these responsibilities.

It has been said many times that "Alaska is our last chance to do it right". However, appropriate decisions are necessary if we are to achieve this goal. These three areas are simply too valuable to allow them to be degraded by mining activity. Stringent regulation of placer mining on the drainages is the only appropriate management policy. If this can't be achieved, then the only remaining solution is a total ban upon such activity.

It is essential that all three drainage systems be managed to comply with the requirements mandated by the legislation which created the conservation and recreation units and the protection provided by the wild and scenic designations. Water quality should be monitored and stringently controlled to ensure that it meets all federal and state standards, and strict mining and water reclamation procedures and regulations are necessary in order to minimize the consequences of mining activity.

It is important that the final alternative selected in each case offer maximum water quality, drainage system, and fish and wildlife protection. I hope they will also incorporate a management philosophy which is designed to protect the conservation, recreation, and wild and scenic mandates which the areas carry. In my opinion, to do less would be unsound policy.

Sincerely,

Mark R. Johnston

Mark R. Johnston
12031 S.E. 280th
Kent, WA 98031

3505 W. 39th Ave.
Denver, CO 80211
July 5, 1988

Mr. Richard Dworsky
Bureau of Land Management
701 C Street, Box 13
Anchorage, Alaska 99513

Dear Mr. Dworsky:

I have read about the series of four environmental impact statements you have recently released on the cumulative impacts of multiple placer mining operations on Alaskan river drainages.

I understand that these statements all downplay the adverse effects of placer mining on the rivers, the surrounding wildlife habitat and on recreational and subsistence uses. I believe that the final alternative should be to give priority to protection of recreation and conservation values of these areas over mining where conflicts exist.

I believe the water quality control measures should comply fully with all state and federal water quality standards and permit limitations.

I would like this letter to be considered in making your final decision.

Yours truly,

Lorraine Lane

Mrs. Lorraine Lane

9

Dear Mr. Dworsky,

I am concerned about the Environmental Impact Statements for the planned multiple placer Mining operations in the National Wild and Scenec River System - Birch Creek, Beaver Creek, and Fortymiale River as well as Minto Flats. The current proposed actions clearly favor mining interests at the cost of conservation and recreation interests and I urge you to implement strict standards of water quality and reclamation as defined under Alternative C. This is our natural heritage and it should not lightly be debased for comecial purposes..

Sincerely,

BOB BARCUS
329 PLEASANT ST.
YELLOW SPRINGS, OHIO 45387

Dear Mr. Ownsky: 7/8/88

<u>REF</u> placer mining - 40 mile watershed, Beaver Creek watershed Birch Creek watershed.

The final alternative must fully comply with the purpose and management mandates for White Mts Nat Rec Area, Steese Nat Conserv Areas, & Nat Wild & Scenic Rivers. Protection of recreation and conservation are priority over mining in conflicts. Implement full water reclamation & water quality control. Use reclamation practices in <u>Alternative C</u>, maximum recovery. Water quality control must fully comply with state & federal water quality standards. This may mean zero discharge in some cases. Unless the final action adequately protects the special values of Steese/White Mts as in "Alternative C" the only other useable alternative is the no mining one. Sincerely

[signature]

R,R.2 Box 1565F
Sierra Vista, AZ 85635
July 5, 1988

Mr. Richard Dworsky
Bureau of Land Management
701 C St., Box 13
Anchorage, AK 99513

Dear Mr. Dworsky:

Thank you very much for allowing me the opportunity to express myself concerning placer mining in Alaska. Please consider this letter my comments on the Environmental Impact Statements for placer mining operations in the areas of Beaver Creek, Birch Creek, Fortymile River and Minto Flats.

I feel it is imperative that water quality contol and full water reclamation be given very high priority in the final EIS's.

Protection of recreation and conservation values must be afforded priority over mining where and when conflicts arise. The final EIS must reflect full compliance with the purposes and management mandates for the White Mountains NRA, Steese NCA and National Wild and Scenic Rivers. Your current proposed action alternative favors mining over other legally mandated public uses, and therefore cannot be tolerated.

Maximum recovery of the mined site and protection of water quality require my endorsement of your Alternative C.

All water quality control measures must fully comply with all state and federal water quality standards and permit limitations. I realize of course that the number of mines and sediment discharges may require the use of Zero discharge water quality treatment systems. These sites, due to the fragility of the Alaskan environment,must be fully restored to the condition in which they were before mining activity occured.

I do not feel no mining should be allowed, but operators must be held fully accountable, and if they are not in compliance with existing laws their permit to operate should be revoked.

Unless your final EIS protects adequately the resource values of the Steese/White Mountain area the only available option will be the "no mining" one.

I thank you. I have only had the privelege of visiting Alaska once so far, but my heart will know no rest until I can return. Please do not allow this beautiful pristine place to be wrecked like areas in the lower 48.

Sincerely,
Janet R. Huebner RN
Janet R. Huebner, RN

6-28-88

Mr. Dworsky,

It's difficult for laymen to read EIS's. I originally read + understood our Forty-Mile EIS to say that we had 4 alternatives to pick from.
13-1 Is the "Proposed Action" an alternative that we can pick + support? I am not the only one confused on this point.

Please answer this + I will try to share your answer with others.

Thank you very much,
Robin

Robin Hammond
Chicken, Ak. 99732

13-1 The Proposed Action and Alternatives A, B, C, are all possible options for managing placer mining in the Fortymile drainage. See Section 2.5 for more information.

July 7, 1988

Ms. Jana Swedo
5305 Middale Lane
Austin, TX 78723

Richard Dworsky
Bureau of Land Management
701 C St., Box 13
Anchorage, AK 99513

Dear Mr. Dworsky,

I am writing regarding the Environmental Impact Statement released by the BLM on the cumulative impacts of multiple placer mining operations in Fortymile River. The protection of recreation and conservation values is mandated in this area, and this protection will be clearly violated by the current Proposed Actions. Unless the final BLM action protects the resources of this area, mining can be shut down totally. Alternative C provides the soundest alternative for full water reclamation and quality control, and will avoid shut-downs.

Sincerely,

Jana Swedo

Jana Swedo

5122 East Citrus Street
Tucson, Arizona 85712
July 7, 1988

Mr. Richard Dworsky
B.L.M.
701 C Street, Box 13
Anchorage, Alaska 99513

Dear Mr. Dworsky:

We would like to comment on the E.I.S. concerning placer mining on Fortymile Watershed.

Protection of recreation and conservation values must be given top priority.

Full water reclamation practices and water quality control measures must be implemented.

The protective measures of Alternative C — maximum recovery of the mined site and maximum protection of water quality — are by far the best choice.

Water quality control measures must comply fully with all state and federal water quality standards and permit limitations.

Sincerely,
Walter + Dorothy Pelech

July 7, 1988

Dear Mr. Dworsky,

I have the following comments to make on the environmental impact of placer mining in four areas of Alaska: Beaver Creek in the White Mountains Nat'l Recreation Area; Birch Creek within the southern tip of the Steese Nat'l Conservation area; the Fortymile River and the area including all drainages flowing into Minto Flats, an important subsistence use area northeast of Fairbanks.

1. The final alternative should be designed to comply fully with the purposes and management mandates for the White Mountains Nat'l Recreation Area, the Steese National Conservation Area and the National Wild & Scenic Rivers. This means protection of recreation and conservation values must be given preference over mining where conflicts exist. The currently proposed actions clearly favor mining to the detriment of other legally mandated public uses and this is not acceptable.

2. Clean water is of the utmost importance. It means life. Therefore it is of supreme importance to implement full water reclamation practices and quality control measures.

3. I endorse the reclamation practices defined under Alternative C - maximum recovery of the mined site and protection of water quality.

4. Water quality control measures should comply fully with all state and federal water quality standards and permit limitations. Depending on number of mines and amount of sediment discharged this may mean implementation of zero discharge water quality systems.

The Sierra Club has endorsed continued operation this summer of several mines which have demonstrated their ability to meet the above requirements.

Unless the final action of the BLM adequately protects the above-mentioned water systems (as in Alternative C) the only viable option will be "no mining." It is possible to both mine and protect the quality and beauty of our wilderness, thus satisfying the interests of all. Thank you for working to insure this.

Sincerely,

Eleanor MacLellan

McKinley Park Station Hotel

July 10, 1988

Mr. Dworsky:

I would like to take this opportunity to comment on the Environmental Impact Statements for Beaver Creek, Birch Creek, Fortymile River, and Minto Flats. Having reviewed the Impact Statements, I would:

1. Insist that the final alternative is designed to comply fully with the purposes and management mandates for the White Mountains National Recreation Area, the Steese National Conservation Area and the National Wild and Scenic Rivers. This means that protection of recreation and conservation values of these areas Must be given priority over mining where conflicts exist. I object to the current Proposed Actions on the grounds that they clearly favor mining to the detriment of other legally mandated public uses.

2. Stress the importance of implementing full water reclamation practices and water quality

McKinley Park, Alaska
99755

control measures.

3. Endorse the reclamation prictices defined under Alternative C -- maximum recovery of the mined site and protection of water quality (return of mined streams to productive fisheries within a reasonable time --25 to 30 years vs. 50 or more).

4. Insist that water quality control measures comply fully with all state and federal water quality standards and permit limitations. Depending on the number of mines and likely amounts of sediment discharged, this may require implementation of "zero discharge" water quality treatment systems.

5. Remind the BLM that unless their final action adequately protects the special resource values of the Steese/White Mountains (as in Alternative C), the only other viable alternative will be the "no mining" one, which I am not endorsing at this time.

Thank you,

Don Soileau

Don Soileau
P.O. Box 968
Denali N.P., AK 99755

110 Oxford
Irvine, CA 92715

July 8, 1988

Mr. Richard Dworsky
Bureau of Land Management
701 "C" Street, Box 13
Anchorage, Alaska 99513

Dear Mr. Dworsky:

I am writing regarding all four of the EISes on the effect of multiple placer mining operations on Alaskan river drainages. In brief, these EISes all understate the harm that placer mining does to rivers, wildlife habitat, subsistence uses and recreation.

I urge that priority be given to protection of recreation and conservation values over mining anytime there is a conflict. Full water reclamation practices and maximum recovery techniques should be mandated in all operations, and the mined site be returned to productive fishery habitat within 25 to 30 years -- not 50.

Placer mining can coexist with other uses -- even the Sierra Club has endorsed continued operation this summer of several mines which have shown that they can meet water quality control measures -- but only if it is done carefully. It is the job of the Bureau of Land Management to make wise management decisions. Please see that placer mining is done in a way which complies fully with all resource protection statutes.

Thank you.

Larkette Lein

Larkette Lein

Howdy!

This is a comment on the E.I.S.s for Fourtymile River and Minto Flats

1. As per mgmt mandates for Wild and Scenic Rivers and related mgmt areas, conservation values must be given priority over mining
2. Full water reclamation practices must be mandated and enforced
3. maximum recovery of mined sites should be mandated
4. I support the "No mining" option in all cases! Thanks, Rich Jones

8772 Cloudleap Court, Apt. #33
Columbia, MD 21045
10 July 1988

Richard Dworsky
Bureau of Land Management
U.S. Department of the Interior
701 C St., Box 13
Anchorage, AK 99513

Dear Mr. Dworsky:

It has recently come to my attention that you have published a series of four draft environmental impact statements (EISs) pertaining to the cumulative impacts of multiple placer mining operations on Alaskan river drainages (Beaver Creek, Birch Creek, Forty Mile River, and Minto Flats drainages). It is hereby requested that my name be placed in your mailing list for notification regarding further developments in this matter and that copies of these four draft EISs be provided to me for review at this time. Although I cannot provide specific comments without access to the draft EISs, I would like to point out that Alaska placer mining operations have been guilty of grossly polluting the streams in question for a number of years and that your agency is among those state and federal bureaucracies which have so far failed in their responsibilities to protect water quality and the environment. Furthermore, there is no excuse for having allowed such despoliation since appropriate pollution control and reclamation technology has been readily available for many years and is economically achievable. For example, as the U.S. Environmental Protection Agency has only recently and partially recognized, 100 percent recycling is the appropriate technology to utilize for pollution control (when incorporated into a properly designed system this can be operated in a zero discharge mode). Of course, there is a wealth of experience in other areas regarding successful land reclamation of mined areas when government requires such protection (unfortunately, industry cannot be relied upon to carry out this responsibility without motivation from government to do so).

Your timely provision of the draft EISs and consideration of these preliminary comments would be appreciated.

Sincerely,

GM Zemansky

G.M. Zemansky, Ph.D.

CHARLIE OTT
Box 69
Denali Park,
Alaska 99755

July 12, 1988

RICHARD DWORSKY - BLM
701 C St.
Anchorage, AK. 99513

Dear Mr. Dworsky;

I am writing you now on the Environmental Impact Statements on the impacts of mining activity on our river and other streams drainages. I have seen considerable of the damage done to our streams and the wildlands around them. It is an absolute disgrace and should never have been permitted to continue!!! And yet your current Proposed Actions all clearly show that you favor mining to the detriment of all the other legally mandated public uses. I say you should all be fired and replaced with people who are not afraid to do the job they are there for!! ANY and ALL final alternatives should comply FULLY with the purposes and management mandates for the White Mtns. Nat'l. Rec. Area, the Steese Nat'l. Conservation Area, and the National Wild and Scenic Rivers. Recreation and Conservation of these areas MUST be given absolute priority over mining!!!! That is the mandate YOU are there to enforce and protect!! And ANY other non-conforming alternatives should not be even considered!

ALL water quality control measures most certainly should comply FULLY with ALL federal and state water quality standards! Even if this means implementation of "zero discharge"!!! Several mines have already adeqately demonstra ed their ability to meet these requirements! It is NOT impossible, or too costly!!! It most certainly can be done. I say maximum recovery of a mined site CAN be done so there is full recovery of the stream in 5-10 years!! That should be insisted on!! Most miners have shown that they cannot be relied on to comply with full water reclamation practices and water quality control measures, it is up to you folk in BLM to SEE to it that they do!!! Those streams and the wildlands around them belong to ALL of us; NOT just to the miners or BLM!!!!!! And many of our Native folk are very dependent on these streams and the wildlands around them, for their subsistence!! Actually there SHOULD BE NO MINING WHATSOEVER on or around them!

Mr. Dworsky I thank you for considering my letter. And I sincerely hope you will regulate ALL mining on ANY of our public lands, so there is NO degrading of water quality, recreation and conservation values, or the wildlands and wildlife around. With all best of wishes, I remain

Sincerely,

Charlie Ott

Charlie Ott

210 Gridleyville Crossing
Willseyville, New York 13864
July 17, 1988

Richard Dworsky
Bureau of Land Managment
701 C St. Box 13
Anchorage, Ak

Dear Mr. Dworsky,

I would like to comment on the Environmental Impact Statement on cumulative impacts of placer mining operations in the Fortymile River watershed. Since this river is a component of the National Wild and Scenic River System, the protection of recreation and Conservation Values must be given priority over mining operations, whenever a conflict exists. Water reclamation practices must be implemented, and water quality should be monitered and kept up to high standards. The reclamation practices defined under Alternative C are acceptable. Minies that can abide by these regulations can continue operation without disturbing the recreational value of this land.

Sincerely,

Robin Wilson

Robin Wilson

United States Department of the Interior

BUREAU OF MINES

Alaska Field Operations Center
201 E. 9th Avenue
Suite 101
Anchorage, Alaska 99501

July 20, 1988

Richard Dworsky
Bureau of Land Management
701 C Street
Box 13
Anchorage, Alaska 99511

RE: Fortymile River Environmental Impact Statement

Dear Mr. Dworsky:

Thank you for the opportunity to review the Fortymile River Environmental Impact Statement. The Alaska Field Operations Center agrees with the implied BLM contention that proper enforcement of present regulations will insure that "unnecessary and undue" degradation of the land does not occur including the preservation of water quality. The Bureau supports any BLM action that will not jeopardize rejuvenation of a responsible healthy mining industry in the Fortymile area.

Overall the document is well organized and information is relatively complete. A Bureau Open File Report 43-80, "Fortymile Placer District Resource Inventory, Alaska," by Douglas B. Colp is not listed in the references. I have attached pages from that report which may be of interest to you as the report summarizes quantity and quality of resource

23-1 by drainage in the Fortymile area. Also, the Bureau of Mines should be listed as a reviewing agency in Chapter V page 5-6.

Please feel free to contact me at the above address if you have any questions or need clarification of these comments.

Robert B. Hoekzema

Robert B. Hoekzema
Chief, Anchorage Branch

cc: Paul Gates
M. Gloster

RBH:cto:1270M

FORTYMILE PLACER DISTRICT RESOURCE INVENTORY, ALASKA

by

Douglas B. Colp

* *Open File Report No. 43-80

NOTICE

The views and conclusions contained in this document are those of the author and should not be interpreted as necessarily representing the official policies or recommendations of the Interior Department's Bureau of Mines or the U.S. Government.

UNITED STATES DEPARTMENT OF THE INTERIOR

Cecil D. Andrus, Secretary

BUREAU OF MINES

John D. Morgan, Acting Director

23 Continued

PLATE NO. 1	Cubic Yards	Ounces
Portage Creek, Pittsburg Creek and its tributaries	2,100,000	45,000
Slate Creek, Ina Gulch, Jim Creek, Gold Run, Green, Ruby and Ben Creeks	4,500,000	97,500
Bullion Creek	1,000,000	22,000
Hutchinson Creek	1,600,000	35,000
North Fork (Area known as "The Kink")	1,400,000	30,000
TOTAL	10,600,000	229,500

PLATE NO. 2		
Mosquito Fork	3,450,000	74,000
Ingle Creek and its tributaries	360,000	7,500
Old Man Creek	420,000	8,200
Moose Creek	700,000	15,000
Gold Creek and its tributaries	2,100,000	45,000
Buckskin Creek	825,000	17,300
Fortymile Pup	1,200,000	24,000
Bench Across from Ingle Creek	680,000	14,300
TOTAL	9,735,000	205,300

23 Continued

PLATE NO. 3	Cubic Yards	Ounces
Mosquito Fork	1,730,000	37,000
Chicken Creek, Stonehouse Creek and its tributary and Myers Fork	700,000	15,500
Lost Chicken, Wall Street and Atwater Creeks	800,000	17,000
Wade and Ophelia Creeks	440,000	9,900
Walkers Fork and Liberty Creek	1,250,000	27,000
Napoleon Creek and its tributary	700,000	15,000
Franklin Creek	560,000	12,000
Buckskin Creek	1,130,000	24,000
Butte Creek	540,000	11,000
Uhler Creek	825,000	17,200
Benches on Napoleon, Chicken, Stonehouse Creeks, Myers Fork and on Lost Chicken Hill	1,950,000	42,000
TOTAL	10,625,000	227,600

23 Continued

PLATE NO. 4	Cubic Yards	Ounces
Walker Fork and McKinley Creek	3,900,000	82,500
Twelvemile Creek and its tributary, Davis, Poker, Younger, Cherry and Crow Creeks	1,400,000	29,700
Smith Creek	430,000	9,700
Canyon, Mariner, Iles Creeks, Squaw Gulch, Babe, Arkansas and Brophy Creeks	2,800,000	59,000
Steele Creek	400,000	8,300
Wade, Gilliland, Grace, Warner, Robinson and Ophelia Creeks	700,000	15,000
TOTAL	9,630,000	204,200

PLATE NO. 5	Cubic Yards	Ounces
Alder Creek	270,000	5,800
Flat Creek and its tributary, Twin Creek and its tributary, Nugget Creek, Discovery Creek and its tributary, Smith, Snow, Sam Patch, Moose and Alma Creek	2,700,000	59,000
Bench ground bordering the Fortymile River	1,100,000	23,700
Dome, Little Johnny, Georgie and Little Miller Creeks	1,800,000	38,500
Bench ground north of Dome Creek	2,500,000	51,700
O'Brien, Dime, King Solomon Creeks, and Liberty Fork	700,000	15,000
TOTAL	9,070,000	193,700

23 Continued

PLATE NO. 6

	Cubic Yards	Ounces
King Solomon Creek and Liberty Fork	1,100,000	23,000
Boundary Creek	1,200,000	26,000
American Creek, Teddy Fork Nugget Gulch, Discovery Fork, Star Gulch and Marion Creek	1,800,000	40,000
Mission and Small tributary	250,000	5,500
TOTAL	4,350,000	94,500

PLATE NO. 7

	Cubic Yards	Ounces
Mission and Colorado Creeks	820,000	16,000
Phoenix Creek	410,000	8,100
Big Boulder Creek	400,000	8,000
Rock Creek	60,000	1,200
TOTAL	1,690,000	33,300

PLATE NO. 8	Cubic Yards	Ounces
Mission and Seward Creeks	680,000	14,000
Rock and Hudson Coulee Creeks	500,000	10,800
Bryant Creek	950,000	20,000
Mogul Creek	800,000	16,000
Gold Creek	200,000	4,000
Sonickson Creek	400,000	8,000
Barney Creek and tributaries	560,000	9,700
Barney Creek North Bench	660,000	14,000
Little Washington, Ruby and Bear Creeks	690,000	15,000
Broken Neck Creek	270,000	5,900
Crooked and Eldorado Creeks	800,000	17,000
Fox Creek, Lucky Gulch and Aurora Creek	820,000	17,200
TOTAL	7,330,000	151,600

23 Continued

PLATE NO. 9	Cubic Yards	Ounces
Placer Creek	270,000	5,900
Nugget Creek	140,000	3,000
Alder Creek	550,000	11,500
Bonanza Creek	270,000	5,900
Flume Creek	550,000	11,500
Bench ground on Flume and Alder Creeks	390,000	8,200
TOTAL	2,170,000	46,000 .0212

SUMMARY

Plate No. 1 - Total	10,600,000	229,500
Plate No. 2 - Total	9,735,000	205,300
Plate No. 3 - Total	10,625,000	227,600
Plate No. 4 - Total	9,630,000	204,200
Plate No. 5 - Total	9,070,000	193,700
Plate No. 6 - Total	4,350,000	94,500
Plate No. 7 - Total	1,690,000	33,300
Plate No. 8 - Total	7,330,000	151,600
Plate No. 9 - Total	2,170,000	46,000
GRAND TOTAL	65,200,000 cubic yards	1,385,700 ounces

.0212

23 Continued

23-1 The Bureau of Mines has been added to the list of reviewing agencies.

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PARKS AND OUTDOOR RECREATION

STEVE COWPER, GOVERNOR

3601 C STREET
ANCHORAGE, ALASKA 99503
PHONE: (907) 561-2020

MAILING ADDRESS:
PO BOX 107001
ANCHORAGE, ALASKA 99510-7001

July 19, 1988

File No.: 3130-1R BLM

Subject: Fortymile River Placer Mining Draft Cumulative Environmental Impact Statement

Mr. Michael J. Penfold
ATTN: Richard Dworsky, Project Manager
Bureau of Land Management
Alaska State Office
701 C Street, Box 13
Anchorage, AK 99513

Dear Mr. Penfold:

We have reviewed the Fortymile River Placer Mining Draft Cumulative Environmental Impact Statement for conflicts with cultural resource laws and regulations. We submit the following comments.

The proposed level of inventory for cultural resources prior to operating plan approval or permit issuance does not appear to be adequate for compliance with Section 106 of the National Historic Preservation Act as amended. An examination of the literature and a check of the Alaska Heritage Resources Survey (AHRS) files will reveal that at least 90% of the area of concern has not been archaeologically examined. If little or no site location information is available, relying on the proposed level of property identification is very close to no review at all for prehistoric sites. Review of literature and the AHRS will not identify all historic sites and structures either. This does not appear to constitute a "reasonable" effort to identify historic resources (36CFR800.4(b)). **24-1**

The DEIS notes that most historic structures and remains are privately owned or not historically significant thereby intimating those properties need not be considered for preservation. Under 36CFR800.4(b), BLM is required to document historic resources to a level adequate to make a determination of eligibility prior to an undertaking which could effect the property. That proviso applies to properties regardless of the ownership of the property. The DEIS is unclear as to how BLM will comply with that requirement prior to operation plan approval. Documentation of properties during compliance monitoring, especially during operation, does not comply with the prior to undertaking requirement. It also does not allow assessment of effect when there is a lack of information about prior conditions. **24-2**

24-3 We request that the BLM provide a plan on how they will bring their mining program into compliance with 36CFR800 regarding the prior identification, evaluation and consultation phases. This is particularly improtant soncidering the apparent time conflict between 36CFR800 regulations and those under 43CFR3809.

We are also interested in reviewing with BLM the possible conflicts between operating under 36CFR800 regulations and 43CFR3809 regulations. These conflicts have not been clearly explained in the DEIS.

Sincerely,

Neil C. Johannsen
Director

Judith E Bittner

By: Judith E. Bittner
State Historic Preservation Officer

JEB:DR:dw

24-1 BLM conducts three classes of inventory: Class I consists of review of existing data including oral and written records; Class II is a sampling field inventory (which may incorporate helicopter overflights, map examinations, air photos, and limited ground testing); and Class III is intensive field inventory "...aimed at locating and recording all cultural properties which have surface and exposed-profile indications."

Mining operations on federal land managed by BLM are divided into two categories according to 43 CFR 3809. Those under five acres in total surface disturbance are required to submit Notices of Intent to operate. Fifteen days after the submission, these miners can proceed with their proposed operations without any acknowledgment from BLM. Those operations over five acres or within special category lands are required to submit a Plan of Operations and BLM subsequently prepares an Environmental Assessment. Only the latter operations require a cultural clearance and approval by BLM. However, as a matter of course the Steese-White Mountains District archaeologist conducts a Class I inventory on all Notice operations. This inventory includes discussion with the miners and field personnel who have been in the area.

During the 1988 season, 11 Notices and 12 Plans of Operations were submitted for the Fortymile drainage. Class I inventories were conducted on all 23 submissions. Eight of the Notice of Intent locations had been previously examined at the Class III level during 1986, as had 11 of the Plans. The submissions were checked when submitted in 1988 to determine that the operators were on substantially the same ground that had been previously examined. The field inventories, acreage, and cultural information was documented in the 1986 annual report submitted to the SHPO from BLM.

The only Plan of Operations not examined at the Class III level was a minimal-impact exploratory operation on Lilywig Creek. The operation consisted of pick-and-shovel exploration. In addition to having flown over the area by helicopter in 1986, (there was no active operation on the site at that time, but there had been previous ones) the archaeologist checked the literature and spoke with the 3809 field compliance officer, who had been on-site and was familiar with the area. As with many of these operations located on previously disturbed ground in valley bottoms, it was determined that there would be little potential for impact to cultural resources. No prehistoric material nor historic structures were known for the area.

24-2 Historic structures and mining equipment on mining claims are generally privately owned. In many cases, these structures and equipment are still in use, either year-round or seasonally, and have been maintained, modified, and/or upgraded by the miners over the years. Mining operations are rarely buried, like prehistoric sites, but rather, dynamic entities that flow into the present. The fine line between historic significance and present use is frequently unclear, and if these features are not subject to destructive impact, BLM's priority concern becomes areas which will undergo destructive impact resulting from the actual mining operation. There have been no cases on a Plan of Operations in the Fortymile drainage where a mining structure or remain has been identified which would require documentation prior to potential impact. Should such a feature be identified, this would be done and subsequent consultation with the SHPO would take place as it has on other potential surface disturbing activities with the District. In the meantime, the slow process

of "catching up" on identification and documentation of all historic structures, features, and activity on mining operations is taking place on a time available basis.

24-3 In 1984, BLM's State Director and the Alaska SHPO signed a Memorandum of Understanding (MOU) in order to streamline the compliance procedures on consultation according to 36 CFR 800 in regard to levels of inventory, site evaluation, and documentation of actions on BLM managed land. The MOU left much of the responsibility for determining site probability as well as evaluation and inventory up to BLM. This MOU requires submission of an annual report to the SHPO summarizing BLM actions under this agreement. Pursuant to this, an annual summary of all cultural resources inventories for mining operations authorized by BLM has been submitted to the SHPO since 1986.

The 1984 MOU has considerably simplified the documentation of inventory work on mining operations within the District. Most mining takes place within claims which have been previously disturbed, in a large part to the point where little of the original soil formation remains. Much of this activity has taken place since the 1930's (in addition to the earlier operations which are usually considered "historic" at this point) and by techniques varying from hydraulic stripping to heavy equipment operation. Usually only small areas are newly disturbed during any given year and these are generally along the lower valley walls on terrain covered with permafrost and its associated vegetation. The "acreage disturbed" on the submissions includes the total amount of ground in use for roads, campsites, water treatment systems (the largest amount and usually in previously disturbed areas), existing cuts, and previously unreclaimed ground -- not just the newly opened areas since 1981.

According to 43 CFR 3809 there is no requirement to document prior to operation; the requirement is to "undertake an appropriate level of cultural resource inventory ... to be completed within ... (30 days) [of submission of the Plan of Operations]." This responsibility and cost is to be borne by the government although the responsibility for avoiding adverse impacts to cultural resources discovered by the inventory becomes the operator's. Since miners submit their Plan of Operations during the winter season, it has been impossible to meet this time frame. As a result, BLM has been letting the responsibility lie with the operator until such time as the archaeologist can get into the field and conduct the inventory. In most cases the operator strips new ground in the fall and works in previously disturbed areas during the early part of the season. This has allowed for reasonable time to examine the ground prior to operation. In addition, as previously stated, the undisturbed ground for proposed impact are not generally areas of high cultural resources potential.

We would look forward to reviewing the possible conflicts between 36 CFR 800 and 43 CFR 3809 with the SHPO.

Bill Wason
Box 110373
Anch, AK 99511

BLM
701 "C" St. Box 13
Anch, AK 99511

Dear Mr. Richard Dworsky;

This letter is to comment on four EIS statements on cummulative impacts of placer mining on Alaska river drainages of Beaver Creek, Birch Creek and Forty Mile River. I ~~was~~ am currently a commercial fishermen and have fished in Kuskokwim & Bristol Bay Drainages. The effects of poor mining practices on Smolt survival rates can often be devastating to salmon runs. The Yukon River run is an important source of subsistence & commercial fish for most of interior Alaskan and should not be destroyed by poor placer mining operations. I endorse the following recommendations,

1) Protect recreation & conservation values of area as a priority over mining
2) Implement full water reclamation ~~measures~~ practices and water quality control measures
3) The prefered reclamation practice would be Alternative C, although even 25 years is a long time to wait to get a salmon stream going again
4) Water discharge should meet all state & federal clean water requirements. Mine sites should have to have "zero discharge" water quality treatment systems.

5) The special resource values of the Steese/White mountains should be protected as under Alternative "C"

I think placer mining can be done on BLM lands, if and only if clean water standards can be maintained. Thank you for this opportunity to comment

Sincerely

[illegible]

BLM AK SO [illegible]

JUL 26 12 19 PM '90

U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 SIXTH AVENUE
SEATTLE, WASHINGTON 98101

JUL 27 1988

REPLY TO ATTN OF: WD-136

Richard Dworsky
Bureau of Land Management
701 C Street
Box 13
Anchorage, Alaska 99513

Re: Fortymile River Placer Mining Draft Environmental Impact Statement

Dear Mr. Dworsky:

The Environmental Protection Agency (EPA) has reviewed the Fortymile River Placer Mining Draft Environmental Impact Statement (DEIS). The Fortymile River watershed is one of four watersheds in Alaska for which the Bureau of Land Management (BLM) is preparing environmental impact statements addressing the cumulative environmental impacts of placer mining. Our review has been conducted in accordance with the National Environmental Policy Act and EPA's specific responsibility under Section 309 of the Clean Air Act to determine whether the overall impacts are acceptable in terms of environmental quality, public health, and welfare.

The alternatives addressed in the Fortymile River DEIS are the same ones presented in the Beaver Creek and Birch Creek DEISs. With the exception of Alternative D, the alternatives differ very little in regard to relative overall environmental consequences. Given the heavy concentration of placer mining in the Fortymile River watershed (including that occurring on state lands outside the jurisdiction of BLM), and the significance of the cumulative impacts, consideration of more restrictive mining controls than those appropriate for less impacted watersheds (i.e., Beaver Creek) is warranted.

EPA's recently promulgated effluent limitation guidelines and new source performance standards for placer mines (published in the Federal Register May 24, 1988) should be reflected in BLM's Proposed Action. Projects determined to be "new sources" under this rule will be subject by EPA to the provisions of the National Environmental Policy Act.

Because of the mobile, ongoing nature of placer mining, and attendant uncertainties regarding the future price of gold, cumulative impacts will occur in the watershed apart from possible "short-term" effects associated with any one operation. The distinction between projected short-term, long-term, and cumulative impacts needs to be clear.

The success of previously applied mitigation measures should be described in order to better judge the effectiveness of those mitigation measures and others listed in the DEIS. An evaluation of streambed restoration techniques and the effectiveness thereof should be included.

Significant impacts to water quality, fish and wildlife habitat, vegetation, and wetland functional values would occur under the Proposed Action given the limited mitigation incorporated into this alternative. Vegetation losses would be long-term in nature and in certain cases permanent, in turn affecting habitat values, water quality, and visual resources. Fish habitat would be directly eliminated, fish migration routes blocked, and fish habitat conditions degraded as a result of sedimentation and turbidity. Considerable winter moose habitat would be lost over the long-term. Wetland functional values would be lost, counter to the Clean Water Act 404(b)(1) Guidelines and EPA Region 10's 404 Mitigation Policy. Subsistence uses would continue to be significantly restricted.

We have rated the Fortymile River Placer Mining DEIS as EO-2 (Environmental Objections - Insufficient Information). Our rating reflects our concerns regarding the lack of controls and mitigation incorporated into the Proposed Action and a range of alternatives and questions regarding the data necessary to provide the basis for conclusions which are presented. A summary of the EPA rating system for EISs is enclosed for your reference. We believe that consideration of the general and specific comments (enclosed) is necessary to provide the basis for a complete assessment of available project alternatives.

Thank you for the opportunity to review the DEIS. We would be pleased to assist BLM in addressing our comments. Rick Seaborne in the Environmental Review Section is the lead contact person for this review and can be contacted at (206) 442-8510.

Sincerely,

Robert S. Burd

Robert S. Burd
Director, Water Division

Enclosures

cc: USFWS
ADFG
COE
ADEC

Page

1. 2-1, 2-13, 2-14: The DEIS should clarify why the alternatives address only performance standards and the court orders, and no alternatives are addressed (besides the no-action alternative) outside the existing 43 CFR 3809 regulations. The basis for the selection of alternatives which are presented should be provided in the EIS. The preferred alternative should be identified as such in the final EIS and justification provided for its selection. Also, we suggest that an "environmentally preferred alternative" be identified in the final EIS. Was an alternative considered which incorporates withdrawal of all or a portion of the study area from mineral entry? **26-1**

2. 2-3: The practice of hydraulic removal of overburden, its relationship to BLM requirements, and corresponding impacts should be discussed. The DEIS should clearly state that discharges to waters of the U.S. from the hydraulic removal of overburden is a violation of the Clean Water Act unless specifically authorized under a federal National Pollutant Discharge Elimination System (NPDES) permit. **26-2**

3. 2-6: The rationale for selection of the Proposed Action (status quo) needs to be presented. Also, the Proposed Action needs to incorporate the recently promulgated EPA Effluent Limitation Guidelines and New Source Performance Standards for placer mines. These were published in the Federal Register May 24, 1988. The new EPA standard calls for recirculation of process wastewater. The state standards include the 5 Nephelometric Turbidity Units (NTU) standard as well as the 0.05 mg/l arsenic standard (not cited in the DEIS). Resultant decreases in discharge effects need to be accounted for under this alternative. **26-3**
Additionally, the DEIS should discuss BLM's intended enforcement programs to assure compliance with state standards and NPDES permit conditions and limitations. **26-4**

4. 2-9, para. 4 and 2-11, para. 2: It should be clarified that EPA NPDES permit conditions are assessed at the point of discharge, prior to entering the receiving stream. **26-5**

5. 2-11, para. 6: Discussion of 0 ml/l settleable solids, and 0 NTU standards under Alternative C is not relevant in light of the applicable standards recently promulgated. **26-6**

6. 2-16, para. 7: The basis for the conclusion that the cumulative (37 mines) effects of placer mining under the Proposed Action would not significantly contribute to water quality deterioration in the watershed should be summarized. **26-7**

26-8 7. 2-17, para. 3: Although cumulative effects to aquatic resources are acknowledged, they are said to be unknown. This sentence should be clarified, per the discussion in section 4-7.

26-9 8. 2-16, para. 8: Short-term vs. long-term impacts need to be defined. The DEIS refers (here and in the description of Alternative A) to an unavoidable "short-term loss of productivity" as a result of mining-induced loss of vegetation cover; however, it goes on to cite disturbed areas which will require up to 50 years to revegetate and extensive areas which will remain permanently barren or sparsely vegetated. These would not be considered short-term effects.

26-10 Do productivity loss assumptions account for ongoing potential future mining in previously reclaimed areas?

26-11 9. 2-17, para. 1: Define "crucial wildlife habitats." Clarify the potential for disruption of these areas based on their locations in relation to existing and potential mine locations.

26-12 10. 2-21, para. 5: Long-term loss of vegetative cover as a result of present and previous mining is an impact applicable to all alternatives. Long-term losses are acknowledged only under Alternative D, the alternative entailing the fewest losses. Also, the relative impacts of previously disturbed areas are only analyzed under Alternative D, resulting in an overstatement of the relative impacts of this alternative. The relative impacts of previously disturbed areas, including long-term impacts, under all alternatives should be discussed.

26-13 11. 4-6, para. 6 and 7: It is unclear how environmental consequences can be addressed in the context of mineral resources. What are the severe negative impacts cited (resulting from cessation of mining activities on public lands within the study area under Alternative D) and why are they of region-wide significance? What are the indirect effects referred to?

26-14 12. 4-8, 4-9, 4-10: Potential erosion impacts resulting from roadbuilding and construction of ancillary facilities need to be analyzed.

26-15 13. 4-11: Potential adverse impacts resulting from fuel and oil spills should be discussed.

26-16 14. 4-11, para. 5: This paragraph appears to contradict the discussion pertaining to chemical water quality impacts included in the Fisheries section (page 4-42). Documented or potential impacts of placer mining on chemical water quality in the drainage under all alternatives should be further addressed.

26-17 15. 4-13, para. 2: Because successful revegetation of all disturbed areas is not possible and cumulative impacts are ongoing, the long-term impacts to water quality resulting from erosion from these areas should be addressed.

26 Continued

16\. 4-13, para. 4: Provide the basis for the conclusion that the downstream effects from non-point sources under the Proposed Action would be indistinguishable from expected natural conditions (last sentence). **26-18**

17\. 4-13 - 4-17: What potential water quality impacts can be expected to result solely from construction of roads and trails? Is this included within the total soil loss figures (Figure 4-1)? **26-19**

18\. 4-16: Water quality impacts occurring either during mine development, as a result of high water and failure of water control structures, or from erosion, are mentioned under Alternative C but not Alternatives A or B. **26-20** What incremental improvement to water quality and channel morphology can be expected to occur as a result of implementation of Alternative C? **26-21**

19\. 4-31, 4-33, 4-35, 4-37: Clarify the potential for disruption of "crucial widlife habitats" as a result of mining activities, based on the location of these areas relative to the location of existing and future potential mine operations. **26-22**

20\. 4-65 - 4-67: The economic analysis is incomplete without a balancing of the economic benefits (given) with the economic costs of placer mining (e.g., costs of regulation, enforcement, management, potential reduced recreation expenditures, etc.). **26-23**

21\. 4-67 - 4-68: The DEIS does not clarify what specific mitigation measures are incorporated into BLM plan of operation approvals. What is the administrative process for reviewing plans of operations and what mitigation requirements can be incorporated through this review process? Discussion of the relative success of mitigation measures should be **26-24** provided with emphasis on streambed restoration. Also, the EIS should discuss BLM's ability to implement a bonding program and why they may or may not choose to do so. **26-25**

22\. 4-70: The difference between the "X" and "some" designations should be clarified in Figure 4-9.

The resource component impacts cited in Figure 4-9 should be reviewed to ensure that all potential irreversible and irretrievable commitments of resources are indicated. It appears that irreversible and irretrievable commitments of resources could occur in relation to several impacts where it is not so indicated in Figure 4-9. These impacts include: loss of fine-grained soil through erosion, accelerated erosion from non-point sources, greater stream channel gradient and reduced sinuosity, loss of fine-grained material in soils, loss of fish habitat, decreased primitive experience. **26-26**

Mitigation measures are presented in Figure 4-9 which go beyond those incorporated into the Proposed Action. Therefore, unavoidable adverse impacts may occur under the Proposed Action which would not occur under Alternatives C or D. The figure does not afford a comparison of the relative impacts, mitigation options, and irreversible and irretrievable

26-26 cont'd commitments of resources specific to each alternative, including the Proposed Action. To assist in this analysis, the figure should identify which alternative applies to which mitigation measure under the column entitled "mitigation under the alternatives," and which alternative applies to "irreversible and irretrievable commitments of resources" designations under the last column.

Additional Comments

26-27 Wetland impacts within the watershed should be addressed in the DEIS vis-a-vis available Corps of Engineers permitting requirements and the Clean Water Act 404(b)(1) Guidelines.

26-28 In order to comply with the 404(b)(1) Guidelines, measures to avoid wetlands, minimize wetland impacts, or provide in-kind replacement of aquatic site functional values must be incorporated into 404 permitting decisions.

26-29 The cumulative impacts of placer mines on wetland functional values should be evaluated.

26-1 Rationale for selecting the Proposed Action as the Preferred Alternative will be part of the ROD. Alternative C has been identified as the environmentally preferred alternative; See Section 2.3. The Department of the Interior, in the EIS for the proposal to designate the Fortymile as a component of the National Wild and Scenic Rivers system, and Congress, in implementing it via ANILCA, assumed that mining would continue in the drainage.

26-2 The practice of hydraulic removal of overburden was discussed briefly in Section 2.3. A mine using this method of overburden removal would be required to meet all of the required standards. Presumably a hydraulic oriented mining operation would need to obtain a NPDES permit as do most placer miners in the area.

26-3 The BLM has reviewed EPA's final placer mining effluent guidelines and accompanying economic analysis and has determined that these guidelines would have no significant effect on BLM's analysis of placer mining impacts in the Fortymile River drainage. BLM examined a wide range of effluent guidelines and water quality standards in the EIS for two reasons: 1) to better understand the significance of different water quality standards and 2) because EPA's effluent guidelines were not final. BLM chose not to address the final EPA effluent guidelines in Alternative C of the final EIS because the guidelines fell within the range analyzed by BLM. EPA's selection of guidelines different than those analyzed in the EIS will not impact BLM's selection of a Preferred Alternative. Any changes to EPA's guidelines would not affect BLM's analysis for the final EIS for the same reasons. The water treatment costs in the draft EIS have been revised to reflect a more appropriate sized mine that processes approximately 50,000 cubic yards per year versus 150,000 cubic yards.

26-4 BLM does not regulate or enforce effluent guidelines or water quality standards.

26-5 The NPDES permit conditions have been clarified in Section 2.3.2.

26-6 The water quality performance standards for Alternative C, zero ml/l settleable solids and turbidity of zero NTU above natural conditions, were chosen because these standards represented the maximum restrictions possible for the discharge of mine effluent. The BLM fully realized that these standards were just one set of several that were being considered by EPA for final effluent guidelines; nevertheless, BLM chose to evaluate the maximum level of water quality standards. EPA's selection of standards different than those analyzed in Alternative C will not impact BLM's selection of a Preferred Alternative, since BLM does not regulate or enforce effluent guidelines or water quality standards.

26-7 Section Section 4.4.

26-8 Precise quantitative assessments of impacts of most resources are not possible with existing data. However, the processes active in the watersheds, both from natural causes and from human disturbances, are well known, and the trends of these processes are documented. Whether verbal qualitative evaluations, or values derived from modeling, the estimates of impacts are intended for comparison of the alternatives in a relative, not absolute sense.

26-9 The time frames for short- and long-term effects vary by resource being evaluated. Short-term impacts to water quality generally last one season during mining, while short-term impacts to vegetation productivity last up to five years after disturbance. Long-term impacts to water quality may begin after mining and continue for 10 or 20 years, while long-term impacts to vegetation are greater than 50 years. Cumulative impacts are defined in the glossary, and quoted from the CEQ regulations at 40 CFR 1508.7 in Section 1.3.

The term "productivity," as used for vegetation, refers to the rate of biomass production, usually expressed as km/hectare/year. Early successional communities such as grass/forb stands often have higher rates of productivity than mature forest stands. So the productivity of a mined site would be very low for several years (barren and sparsely vegetated), increase rapidly for 5 to 50 years after mining, then gradually begin to decrease as forest cover becomes reestablished.

26-10 Yes.

26-11 The definition of "crucial wildlife habitat" has been added to the glossary. Discussion concerning the presence and potential effects of mining to these areas may be found in Sections 3.6 and 4.6.

26-12 This section is a brief summary of environmental consequences. See Section 4.5 for a full discussion of the impacts of the various alternatives on vegetative cover.

26-13 Environmental consequences also include impacts upon mineral resources, in terms of exploration/development/production, as discussed in the draft EIS. The way in which the various alternatives impact mineral resources is considered to represent the manner in which "...environmental consequences can be addressed in the context of mineral resources."

26-14 See Figure E-1, Appendix E-1, and Section 4.4.

26-15 See Section 3.4.4 for regulations governing the storage and use of fuel and other hazardous material. See Section 4.12 for a discussion of mitigating material spills.

26-16 See text revision at the beginning of Section 4.4.

26-17 See revisions to Section 4.4.

26-18 See revisions to Section 4.4.

26-19 See Figure E-1 in Appendix E-1, and Section 4.4.

26-20 This was an oversight and has been corrected in the Final EIS.

26-21 Incremental improvement to water quality and channel morphology under Alternative C would result from enhanced reclamation requirements and stricter effluent standards. Failure of water-control structures and in-stream operations during mine development would affect all alter-

natives, but under Alternative C would be a primary source of sediment loading (along with non-point erosion) if other requirements were met. The projected improvement under Alternative C, while not strictly quantifiable, would also be a result of fewer mining operations overall due to stricter standards (an assumption based on the economic analysis).

26-22 The definition of crucial wildlife habitat has been added to the glossary. Discussion concerning the presence and potential effects of mining to these areas may be found in Sections 3.6 and 4.6.

26-23 Changes in government labor costs associated with regulation, enforcement, and management would be negligible, i.e., estimated annual labor costs would change by less than one workmonth for each alternative. Since the amount of change in recreation use cannot be predicted, we are unable to determine the corresponding change in recreation-related expenditures and employment.

26-24 Specific mitigation measures that may be incorporated into Plans of Operations have been included in Section 4.12. The administrative process for reviewing and approving plans are discussed in the Bureau Manual section on surface management under 43 CFR 3809.

26-25 See Section 2.3.1. BLM's policy with respect to bonding is set forth in 43 CFR 3809.1-9, see also Public Law No. 99-500.

26-26 Section 4.12 has been substantially revised. See Figure 4-10.

26-27 Section 3.5 has been revised, incorporating new data on wetlands received from the Corps of Engineers.

26-28 This is a function of the Corps of Engineers in their permitting process.

26-29 The Corps of Engineers conducts evaluations; see Section 3.5 and Appendix F-1.

Richard Dworsky,

Re: the final BLM decision on Placer Mining on Alaskan river drainages.

The final alternative must comply fully with the purposes and management mandates for the White Mountains National Recreation Area, the Steese National Conservation Area and the National Wild and Scenic Rivers. In other words the protection of recreation and conservation values of the above areas must take priority over mining wherever conflicts exist and full water reclamation practices and water quality control measures must be implemented. The BLM's environmental impact statements are already setting up a pro-business, anti-conservation decision.

Thank you,

Tom Cope
BOX 328
Richfield, OH
44286

★ Fairbanks North Star Borough

809 Pioneer Road · P.O. Box 1267 · Fairbanks, Alaska 99707 · 907 452-4761

July 26, 1988

BLM Alaska State Office
701 C Street, Box 13
Anchorage, AK 99513-0099

RE: Forty Mile River - Draft Cumulative Environmental Impact Statement

The Fairbanks North Star Borough has reviewed the application you submitted to this office. We have no comments regarding this proposal.

Thank you, however, for the opportunity to review and comment on this application.

Sincerely,

Rex A. Nutter

Rex A. Nutter, Director
Department of Community Planning

RAN/BS/bjs

Aug 3 1 33 AM '88
BLM AK SO 3744

July 27, 1988

Fortymile River EIS
c/o Richard Dworsky
Bureau of Land Management
701 C Street
Box 13
Anch. Ak 99513

In reference to the EIS ~~statement~~ issued by the BLM, Anchorage office I found the draft very informative and ~~it~~ was interesting reading. The Fortymile area mining started in the 1870's and with ups and downs continues today as the only resource coming directly from the earth.

The village of Chicken soon followed gold discovery and has survived with a large percent of its income dependent on mining. It is pointed out that this area is not used as a substance area for many people. Chicken survives on staples trucked into the area purchased from income derived from mining related activities.

The EIS goes into great length in estimating the acreage that will be disturbed in each plan and each acre that is, for lack of a better term, put out of use for a period of time by being mined is important to the survival of a certain number of the original residents (birds, bugs, fish and animals). Man has needs too and the EIS shows that under any supervision at all about three hundreths of one percent of the land in the Fortymile water shed will be involved and time will take care of these wounds and once again it will be productive to the environment.

There is considerable mention of the value of the area for recreational purposes but my family and I have been on the creek every summer for 15 years and I have yet to see anyone using the land for anything but mine related activity. Fortymile river is used by a considerable number of canoers but these users are in general young people and not family outings. The local area derives very little income from this activity. The participants bring everything they need from Fairbanks, Anchorage or outside. In considering the tourists on the highway a large percent are mainly interested in seeing the old mining site, how it is done today and doing a little panning.

A considerable amount of space in the EIS report has been taken up by talk of dirty water. I don't think its pretty but it won't hurt you and the fish and their habitat are still there after 100 years of mining. Virtually no year around residance make use of the rivers for drinking purposes (human that is).

The gold is steadily being mined out and with proper guidelines less land will be disturbed each year. Within a short time the problem will take care of itself. My thoughts are lets continue mining along similar guidelines as prevailed 10 years ago.

Back to reality with the present. "dog in the manger" attitude of those strangling the mining industry we will be forced to hope for alternative A.

winter address

Les MAXWELL

Canyon Creek
Boundary

3910 Lac Sault Ave.
Anch. Ak. 99516

29 Continued

Donald C. Pendergrast
1744 Bridgewater Drive
Fairbanks, Alaska 99709
(907) 452-7616

Forty Mile River and Minto Flats EIS's — August 3, 1988
c/o Richard Dworsky
Bureau of Land Management
701 C Street, Box 13
Anchorage, Alaska 99513

Dear Mr. Dworsky,

I wrote you earlier this summer concerning the Birch/Beaver Creeks EIS's. I indicated that while not opposed to the placer mining I felt that the industry should be held to high standards which insured the protection of the environment.

Now that the EIS's for the Fortymile River and the Minto Flats have been made available I would like to comment briefly on them:

For the Fortymile River I support Alternative C (as I did for the Beaver/Birch Creeks). For the Minto Flats I support Alternative A.

I think that the reclamation program, as defined in Alternative C, is especially important. The reclamation will minimize polluting runoff of abandoned mining sites. Fish habitat and passage will be enhanced if the stream beds are kept clear and returned to normal. Site reclamation should be done to reduce the recovery from 50 years to 25 years, thus increasing productive wildlife habitat quickly.

Full compliance with state and federal water quality standards must be met. These are National Wild and Scenic Rivers and the Bureau of Land Management is legally and morally bound to make certain that the water quality is not degraded.

I hope that BLM will take whatever actions necessary to eliminate the existing adverse effects which placer mining causes to Alaska's resources that subsistence users rely upon.

Thank you,

Donald C Pendergrast

Donald C. Pendergrast

AUG 8 8 08 AM '88

BLM AK SO 374A

August 1, 1988

Dear Mr. Dworsky,

As one more American family who loves the wilderness and awesome beauty of Alaska, we wish to forcefully comment on the impact of placer mining in the Fortymile Watershed.

BLM's Environmental Impact Statement on impending degradation to the Fortymile Watershed appears to utterly disregard its legal mandate to wisely husband and manage the American people's land.

Your Environmental Impact Statement downplays the terrible effect of placer mining on the rivers and wildlife habitat and recreational uses of Fortymile. BLM's analysis claims that requiring clean water discharge and sound reclamation practices will only have minimal benefit and that therefore these sane practices would prove an unnecessary burden on miners.

This slant on your E.I.S. is not only disingenuous, it is wrong. Those who would profit by besmirching and fouling our Alaska should, without question, be absolutely required to enact sound water discharge practices and proper reclamation methods.

Equally outrageous, your Proposed Actions do not provide legally mandated protection to the National Wild and Scenic Rivers, including the Fortymile River. This violates your responsibility as written into law by Congress.

Our family insists that the final alternative is designed to fully comply with the purposes and mandates for the White Mountains National Recreation Area, the Steese National Conservation Area and, certainly, the National Wild and Scenic Rivers.

We endorse those reclamation practices defined under Alternative C, maximum recovery of the mined site and strict protection of water quality (i.e., the return of mined streams to productive fisheries within a "reasonable" time, 25 years rather than 50 years.).

Water quality control measures should absolutely comply with all state and federal water quality standards and permit limitations, even though this may require "zero discharge" water quality treatment systems. As you know, the Sierra Club has endorsed operation of several mines which have shown their ability to meet this strict requirement.

Additionally, we wish to remind the BLM that unless their final action sufficiently protects the irreplaceable and unique resource values of the Steese/White Mountains (as in Alternative C), the single remaining alternative will be a "no mining" alternative.

We do not know one another, sir, and I do not want to believe that you as a public servant are less dedicated to protecting the beauty of Alaska than we are.

Administrations in Washington come and go, but the American people are fed-up with the sleazy land-grabs and trade-offs and "exceptions" and despoilation we have witnessed during the past 7½ years.

All this family asks is that you folks do your jobs and wisely protect our land as you have been legally mandated to do.

Please do not allow placer mining to bespoil Fortymile River Watershed.

Yours truly,

Jake Schwartz

The Jake Schwartz Family

190 8th Avenue
San Francisco, California 94118

c.c. Honorable Barbara Boxer
Secretary of the Interior Donald Hodel
Senators Alan Cranston and Pete Wilson

Michael A. Spindler
PO Box 270
Kotzebue, Alaska 99752
Aug 3, 1988

Placer Mining EIS
c/o Richard Dworsky
Bureau of Land Management
701 C. st., Box 13
Anchorage, Alaska 99513

Dear Sir:

I am writing in favor of Alternative C in the Birch Creek, Beaver Creek, and Fortymile River EISs. I also support Alternative A in the Minto Flats EIS. I am extremely concerned over water quality, fishery quality, and scenic degradation caused by placer mining in these areas. I have floated the Fortymile and Birch Creek, and have spent time in the Minto Flats area. I am aware of their value for recreation, subsistence, and sport hunting and fishing. I feel that your previous policies have largely permitted this degradation to occur. I am specifically concerned that future management of these areas minimize stream sedimentation and pollution, retain scenic qualities, and mandate rapid recovery and revegetation of mined areas. Miners are a minority in this state and nation, and your policies should reflect that such a minority should not be allowed to diminish environmental quality for their personal economic gain. A few enlightened miners have begun to use environmentally sound procedures and I feel you should encourage such practices by giving them preferential treatment in your regulations and policies. I therefore support Alternative C for Birch, Fortymile, and Beaver; and Alternative A for Minto Flats.

Sincerely

Michael A. Spindler

August 3, 1988

Dear Sir,

Allow me please to place my comments regarding the opening of placer mining in the Fortymile River watershed into consideration.

Whether government officials will admit it or not, placer mining will eventually foul and strip and destroy this lovely wilderness. Why? It is the old story of allowing the rapacious camel to get his greedy nose under the tent...

This said, we citizens must once again do battle with "our" government to protect our pristine wilderness from exploitation by the private interest. Though it is difficult these past eight years to sometimes distinguish between "private interests" and the Department of Interior, permit me to have my say about the destruction of the Fortymile by mining.

BLM's Environmental Impact Statement unrealistically downplays the cataclysmic effect placer mining will have on the wildlife habitat, the rivers and streams, and the recreational use of Fortymile watershed. Certain conclusions of your analysis are contradicted by your own data elsewhere in the same E.I.S.

It is utterly vital, yes, vital, that full water reclamation practices and H_2O water quality control measures be be implented and enforced. Yes, e-n-f-o-r-c-e-d.

It is imperative as well that the final alternative is designed to comply fully with the purposes and management mandates for the White Mountains National Recreation Area, the Steese National Conservation Area and the National Wild and Scenic Rivers. In plain English, sir, this means that protection of recreation and conservation values must be given priority. "Protection." Not "accomodation" or "limited" or "low-impact", Full protection.

Wise people who care about wilderness for future Americans, will endorse those reclamation practices defined under Alternative C, maximum recovery of the mined site and protection of water quality. This means the return of mined streams to healthy fisheries within a reasonable time.

Water quality measures must comply fully with all state and federal H_2O quality standards, not some lame excuse of these standards.

Unless BLM's final action protects the special resource values of the Steese/White Mountains, as in Alternative C, the only other alternative will be a "no mining" one. Please protect our dwindling wild majesties from those who blindly foul them.

Thank you for your time and shared sense of responsibility.

R. A. Appel R. A. Appel 190 Eight Avenue, San Francisco, CA 94118

copies to: Hon. Barbara Boxer, Secy. of Interior Hodel, Sen. Alan Cranston

Dinyee
P.O. Box 1372
Fairbanks, AK 99707

August 5, 1988

Placer Mining EISs
c/o Richard Dworsky
BLM
701 C Street, Box 13
Anchorage, AK 99513

Dear Mr. Dworsky:

Dinyee is writing to give comments on the Minto Flats and Fortymile EISs. Dinyee is very concerned about water quality. The people along the Yukon depend upon it as their lifeline. We don't ever want to see signs there stating 'please do not eat the fish' due to contamination. We want to see fish runs strong and growing in the river. Many people from tourists to subsistence fisherpeople are involved with the salmon and other fish in the river. We need clean water to come into the Yukon without heavy metal pollutants or other inorganic substances which can be posionous to the food chain. There are many pollutants entering into the food chain and we do not need the synergistic effect of more that we can prevent. Every step should be taken to eliminate these impacts. The subsistence economy is in sad shape because of these impacts. We support the Alternative C for the Fortymile EIS and the Alternative A for the Minto Flats EIS. These seem to offer the best environmental protection for these rivers and ultimately the Yukon River.

In service,

Dave Lacey

Dave Lacey
General Manager
Dinyee

BLM; Richard Dworsky
701 C St.   Box 13
Anchorage, AK 99513

Aug. 3, 1988

Dear BLM / Mr. Dworsky,

I am writing concerning the Draft Cumulative E.I.S. on the 40-mile.

I would like to support Alternative A, with the inclusion of E.P.A. Variances.

Sincerely,
Chas Hammond

Charles R. (Dick) Hammond
Gen. Del.
Chicken, Alaska
99732

Fortymile River EIS
c/o Richard Dworsky
Bureau of Land Management

Dear Richard Dworsky

I can't beleive how the Sierra Club runs this state. I guess we don't need BLM we have the Sierra Club to manage the state.

I can't understand how you can figure out the cumulative impact of placer mining will have on the land in the future. Mining has been going on in the Fortymile for a hundred year so you should already know the impact it has had. You should take a survey of the tourist that travel the

Taylor Highway how the fell of mining and why they came the Taylor Highway way.

Since we are going to be stuck with one your regulations, Alternative A would be the best but should have a variance in it and the discharge point should be a 1000 feet below mine to be measured.

Eric Kile, Alvin Kile
Camp Creek Mining
Boundary Alaska
99790.

Eric E. Kile

EIS Comment

Joe Van Horn
Box 111
Denali, Alaska
99755

Dear Sir

Aug 5, 1988

I would like express my strong support for strict environmental protection for placer mines operating on federal lands.

I support Alternative C in the Birch Cr, Beaver Creek and Fortymile EISs and Alternative A in the Minto Flats EIS.

The reclamation Program in Alternative C is extremely important to me. It will reduce the recovery time from 50 to 25 years, ensure safe fish passage, and minimize non-point Pollution runoff from mine sites.

There should be no degradation of water quality of National wild + Scenic Rivers. There should be full Compliance with state + federal water quality Standards

BLM Should at least minimize the adverse effects of Placer mining to subsistence uses and resources if not totally eliminate them in most Cases

Joe Van Horn

Aug 7, 1988

Placer Mining EISs
c/o Richard Dworsky
Bureau of Land Management
701 C Street Box 13
Anchorage AK 99513

Dear Mr Dworsky,

Just a short note to let you know that I support strong environmental protection for placer mines operating on federal lands. I support Alternative C in the Birch Creek, Beaver Creek, and Fortymile River EIS's, and Alternative A in the Minto Flat EIS. I think it is important to implement the reclamation program defined by Alt. C to: 1 reduce recovery time of soil + vegetation from 50 to 25 years; and 2 ensure safe passage of fish through mining operations and reclaim fish habitat; and 3 minimize nonpoint pollution runoff from mine sites.

I also think it is important that water pollution control measures result in full compliance with state and federal water quality standards and that BLM not allow degradation of the water quality of National Wild and Scenic Rivers.

I hope BLM will take all possible actions to minimize or eliminate the existing adverse effects that placer mining has caused to subsistence uses and resources.

thank you for your time.

Sincerely,

Sue Keller
360 Louise Lane
Fairbanks AK 99709

Aug 9 12 14 PM '88

BLM AK SO 074A

CAMP·DENALI NORTH FACE LODGE
P.O. Box 67, Denali National Park, Alaska 99755 • (907) 683-2290
Winter: Box 216, Cornish, N.H. 03746 • (603) 675-2248

August 6, 1988

Placer Mining EISs
c/o Richard Dworsky
Bureau of Land Management
701 C Street, Box 13
Anchorage, Alaska 99513

Dear Mr. Dwaorsky:

This letter is in reference to future BLM placer mining policy.

Regarding the EISs done on Birch Creek, Beaver Creek and Fortymile River, We support Alternative C. We support Alternative A in the Minto Flats EIS.

The reclamation program defined By Alternative C will reduce the recovery time of soil and vegetation and it will ensure safe passage of fish through mining operations and there are features in it that will provide for reclamation of fish habitat upon completion of mining. It will also minimize non-point pollution runoff from mine sites.

It is of utmost importance, we feel, that water pollution control measures be in full compliance with state and federal water quality standards and that BLM not allow any degradation of water quality of National Wild and Scenic Rivers.

We trust that you will take all possible attempts to minimize the existing adverse effects which placer mining has caused to subsistence uses and resources.

Thank you.

Sincerely,

Wallace A. Cole
Jerryne M. Cole

Wallace A. Cole
Jerryne M. Cole

Wildlife • Natural History • Wilderness lodging and vacations in the shadow of Mt. McKinley

Richard Scruggs
P.O. Box 103054
Anchorage Alaska
99510

I feel that very few if any of the testimonies made at the open meeting at Chicken will effect the out come of these EIS proposals
I believe these proposals are the result of BLM trying to appease a limited number of people and agencys who are not residents nor regular users of the Historically Known 40 Mile District. Many Have not even been in the areas covered By the study In this Historically Known mining district the 40 mile the laws and presidents have already been set. Is Known for its mining history not the classification of a Scenic River although all the area is nice.

The use of the 40 mile and practices have been in place as a mining area since discovery and should not be changed or reclassified or altered by new proposals or agency Idea's of managent.

I feel that so presented none of the IES proposals can be accepted by the traditional users (miners) of the Historical Mining District the 40 mile Data in the proposals EIS needs to be checked like 37 claimholders and the 1981 acres destroyed By miners

Thank You Richard

BLM AK SO
AUG 9 9 40 AM '92

545 Forest Green Dr.
Tallahassee, Florida
Aug 1, 1988

Richard Dworsky
Bureau of Land Management
701 C Street Box 13
Anchorage, Alaska

Dear Mr. Dworsky,

I wish to recommend the NO MINING alternative for:

both a. Fortymile River AND
b. Minto Flats

I urge you to make water quality and recreation values higher priorities.

Sincerely,
Sandra L. Carnes

August 1, 1988

Dear Mr. Sivarsky,

Concerning the E.I.S.'s for Beaver Creek, Birch Creek, Fortymile River and Minto Flats, we believe that 1) we must comply fully with the purposes stated in conservation mandates such as the Nat'l Wild & Scenic Rivers & Nat'l. Recreation & Conservation Areas.

2) full water reclamation & quality control must be implemented for any mining activity.

3) adequate protection must be given to the special resource value of the Steese/White Mts.

4) recommendations not favor mining to the detriment of other legally mandated public uses of valuable Alaska public lands.

Thank you for consideration of these concerns.

Sincerely,

Milton & Joan Gottlieb

(Mr. & Mrs. M. Gottlieb)

Richard Dworsky
701 C. Street, Box 13
Anchorage, Alaska 99518

Attn. E.I.S. Draft Comments:

I attended the scoping meeting in Chicken on september, '87 and made my written comments for review for the E.I.S. Draft. The people, organizations, & agencies involved as an E.I.S. Team submitted a number of misleading statements and failed to include other important details in the E.I.S.

1. The animal habitats are not endangered by mining activities on the Fortymile drainage. I see moose in the evenings enjoying the settling ponds that a miner built here in Chicken. The hunting season on the Fortymile area is open to many more hunters in September since other hunting areas are closed down and more hunting now occurs on the Fortymile. Fish and Game opened up a cow season for moose some years back, so as anyone knows,

when you kill your producers, you decrease the moose population. The miners weren't responsible for that decision. Fish and Game published a flier three years ago stressing the fact that bears were contributing to the decreasing moose population. Inspite of bad management on Fish & Games part, the moose population is still increasing. I would like to see included in the E.I.S. data, the fact that mining produces a positive impact on the moose population.

2. The statement of 30-50 years time for regrowth and restoration of the mined area is false. A figure of five years (5) is more exact.

3. Mining on the Fortymile contributes to the local and statewide economy. I have worked at the lodges in Chicken and Boundary. The tourists are so interested in the mining

history. They sometimes go to the operating mines, and want to know where they can buy gold, and say how delighted and interested they are because this is a mining district. I would like to see included in the final Fortymile Draft information highlighting how much mining has contributed to not only the local economy, but statewide. The historical implacations, economic, and the lack of negative impact on the environment should be inclued in the final Draft stating that mining needs to continue indefinately.

4. The E.I.S. doesn't adequately analyze and interpret the results of the water qualily samples collected in the Fortymile drainage during 1987. The cumulative impacts of water quality from all mines did not impact the stream water qualily in 1987.

I want a more detailed analysis and report on writer quality, and an evaluation of the cumulative impacts in each of the drainages

· I want the proposed action in the final E.I.S. to include turbidity variances in the E.P.A. discharge permit.

The EIS. states an incorret amount of PAYdirt material moved by the miners. Most mines operate from June to September, but only sluice about 10% of the Time. The remaining time is spent building settling ponds, reclaiming mined ground, repairing equiptment, and stripping overburden. 43-1

In one mining season I sluice Approximately 3,000 cubic yards. The figures in the sediment model need to be recalculated. 43-2

All the mines in the Fortymile use existing trails and roads with little or no expected improvement in these trails. The trails will not be improved to all weather roads, and there should be no change in impacts from the existing usage of the roads. There are no water quality impacts from the existing roads and trails as shown by the water quality sampling in 1987

43-3 The E.I.S. alternatives are based on 32 mines. There should not be any reference in the final Draft of any number of mines. The Fortymile has more mines than is mentioned in the draft And therefore should not use incorrect numbers relating to the amount of operations that are in existance

6. The people, organizations and agencies who reviewed and were involved in putting together this costly E.I.S. Draft failed to include vital information for a fair and complete draft. many figures are misleading on water quality and animal population. I would like to see some miners directly involved in the E.I.S. Final draft, some housewives, and more informed participants from Alaska who actually live out in the Fortymile or in Birch Creek, Minto. Please be informed that we miners who live out here love and respect this land and do not intend to jeopardize the habitat or the water quality.

Sincerely, John R. Burns / 8/8/88
Cristal Fagundes

43-1 The estimated amount of gravel processed has been reduced from 150,000 cubic yards to 50,000 cubic yards.

43-2 The use of the sediment model has been modified for the final EIS.

43-3 The estimated number of mines and other activities associated with mining in the Proposed Action and the alternatives are based on a methodology described in Appendix B-1. The projected number of operating mines does not represent a threshold of mining activity that would be allowed. The BLM does not have the authority to regulate the level of mining activity. Estimating the number of mines that could be operating under the conditions of each alternative was necessary to analyze the cumulative impacts of placer mining. After evaluating this information, the BLM could then make an informed decision regarding the future management of placer mining activities. The BLM fully realizes that the number of mines and associated activities in each alternative are just projections and may not accurately reflect what actually occurs over the next 10 years.

Gentlemen:

IN MY ESTIMATION THE DRAFT. EIS HAS DOES NOT ADEQUATELY ANALYZE OR EVALUATE THE CUMULATIVE IMPACTS OF PLACER MINING ON WATER QUALITY. WATER QUALITY SAMPLES WERE COLLECTED IN 1987 AND THE WATER QUALITY WAS GOOD. THE WATER QUALITY DATA SHOWS THAT MINING HAD VERY LITTLE CUMALATIVE IMPACT ON WATER QUALITY.

I WOULD LIKE A BETTER ANALYSIS EVUALUATION OF THE CUMMATIVE IMPACTS ON WATER QUALITY. IN FINAL EIS. THE DATA DOES EIST FOR A BETTER ANALYSIS

THANK YOU

G.A. Hankerson
By G.A. Hanks (partner)
Chicken alaska

August 5, 1988

Fortymile River EIS
c/o Richard Dworsky
Bureau of land Management
701 C St.
Box 13
Anchorage, Alaska 99513

Dear Mr. Dworsky

After reading the EIS for the Fortymile River, I feel a great fear for the future of Placer Mining in this area.

We (the miners), have been under considerable pressure for a number of years. Fearing that our means of feeding our families was being threathened by numerous rules and regulations, and various environmental groups.

But when it is believed by the Federal Govt. that increased mining, which would bring thousands of dollars to the people of Alaska and numerous businesses thru out Alaska is a "WORST-CASE" SCENARIO, WHAT HOPE DO WE HAVE FOR THE SURVIVAL OF THE MINING INDUSTRY!

NONE of the proposed plans are beneficial to the growth of the mining industry.

However, I feel that the lessor evil of them all, if we have no other alternatives, would be the proposed action.

However, I would like to point out a few things.
1. The animal habitats are not endangered by mining activities on the Fortymile Drainage. However, they are endangered by the great numbers of hunters who come to the 40 Mile to hunt, because other hunting areas are closed. Our settling ponds are havens for ducks and geese, and moose and caribou enjoy the new growth of vegetation on our old tailings. These facts should be included in the EIS.

2. Mining in the Forty Mile contributes to both our local and statewide economy. Based both on personal experience, and talking to others miners, most money that is taken out of the mines, goes right back into the mine, by improving equipment and mining practices. This type of information should be included in the final EIS.

45-1 3. I believe that a false picture has been painted in the EIS in regards to the amount of time a miner is actually sluicing. Our mining season is basically from late May to early September. in a good year we might be able to put thru the sluice box 3 cuts. This means that out of those, say 106 days, only approximately 15 days is actually spent in running dirt thru our sluice box. This figures out to only 15% of the mining season. The other 85% is spent building settling ponds,reclaiming mined ground, stripping overburden, and repairing equipment.
This scenario is typical of a placer mine and should be included in the final EIS.

Aug 10
BLM AK SO

4. All of the mines in the Forty Mile use trails and roads that have been in existance for many years. There is little change or impact from the usage of these trails to either the environment, the wildlife or water quality. This information should also be included in the final EIS.

5. There are a number of claims in the Forty Mile area that are not being worked, and may never be worked, but I feel that it is detrimental to our industry to put any numbers of mines in the final EIS.

6. I disagree with the statement of 30-50 years time for regrowth & restoration of a mined area. From our experience, in 5 to 10 years the vegetation has significantly reclaimed mined areas. This figure of 30-50 years presents a false picture, and I beliwve a more reasonable figure of 5 to 10 years should be in the final EIS. **45-2**

7. It is vital that the information in the EIS concerning the quality of water in the Forty Mile be based on the current data. The mining practices and methods have improved considerably though the past years to the excellent quality that it is today. It should be stressed that mining can coexist with recreational users of the watershed.

8. I feel that vital information for a fair and complete draft has been left out. many figures are misleading. Information showing the positive aspects that mining has contributed to the watershed have been played down or left out altogether. I believe that miners directly involved in the 40 Mile area should be invloved in the final EIS, as well as, local business persons, and people who actually live in the Forty Mile.

In closing, the EIS states that most recreational visitors to the area simply sight see from their vehicles. Only 5 to 10% camp in the watershed and a somewhat lower percentage go on float trips, pan for gold, hike, pick berries, or engage in other types of recreational activities. We, who live here in the 40 Mile, are part of this habitat 100%. We love and respect the land, and do not intend to jeopardize the environment in anyway.

Thank You,

Dave Kukowski

Box 6
Chicken, AK 99732

45-1 The estimated amount of gravel processed has been reduced to 50,000 cubic yards per year.

45-2 The data in Figure 4.2 are a compendium of regional data from the literature and field work. The regrowth times to a sustaining tall shrub community represent an average for different conditions and vegetation communities. Actual regrowth times will vary considerably as a function of soils, location, disturbance history, and microclimates, and may be faster on some sites. See text revisions, Section 4.5.

August 6, 1988

Fortymile River EIS
c/o Richard Dworsky
Bureau of land Management
701 C St.
Box 13
Anchorage, Alaska 99513

Dear Mr. Dworsky:

First I would like to say that I know a lot of money, time and effort has gone into the EIS Draft for the FortyMile area. However, I believe that vital information for a fair and complete draft has been left out. Many figures are misleading. Information showing the positive aspects that mining has contributed to the watershed have been played down or left out altogether. I believe that miners directly involved in the 40 Mile area should be involved in the final EIS, as well as, local business persons, and people who actually live in the Forty Mile.

An alternative that was mentioned and discarded should, in my opinion, have been looked at and studied more closely. That being the redesignation of the Fortymile River. If the Wild River status of the stream were removed and the drinking water standard changed to that of an industrial standard, then most of the problems regarding water quality would be removed. Since this EIS mainly originated because of water quality in the watershed, this would seem to be an important point.

I would like to see current data concerning the quality of water in the Forty Mile. The mining practices and methods have improved considerably through the past years to the excellent quality that it is today. It should be stressed that mining can co-exist with recreational users of the watershed.

All of the mines in the Forty Mile use trails and roads that have been in existance for many years. There is little change or impact from the usage of these trails to either the environment, the wildlife or water quality. This should be stressed in the final EIS rather than how it was presented in the draft.

Mining in the Forty Mile contributes to both our local and statewide economy. Most money that is taken out of the mines is put right back into the mine, by improving equipment and mining practices. Thus the local businesses and the states economy is benefited. These facts should be stressed in the final EIS.

I believe that a false picture has been painted in the EIS in regards to the amount of time a miner is actually sluicing. Our mining season is basically from late May to early September. In a good year we might be able to put thru the sluice box 3 cuts. This means that out of those, say 106 days, only approximately 15 days is actually spent in running dirt thru our sluice box. This figures out to only 15% of the mining season. The other 85% is spent building settling ponds, reclaiming mined ground, stripping overburden, and repairing equipment.

This is typical of a placer mine and should be included in the final EIS. The draft seemed to plant the idea that sluicing was an on going thing, not just a couple of times a year reality.

The animal habitats are not endangered by mining activities on the Forty Mile drainage. Our settling ponds are havens for ducks and geese, and moose & caribou enjoy the new growth of vegetation on our old tailings. We fish from the river all of the time,and the grayling are more plentiful now then they were before there was mining activity in this area. This information should be stressed in the final EIS.

The claim that the regrowth and restoration of a mined area takes 30 to 50 years is exaggerated. I believe that a more reasonable figure, based on our experience, is from 5 to 10 years. This should be changed in the final EIS.

I believe that none of the plans proposed in the EIS draft are beneficial to the growth of the mining industry. The lesser evil of them all, if we have no other alternative, would be the proposed action. However, I would like to see some of the above points, and as stated before, some positive statements in behalf of the mining industry presented instead of omited.

The EIS draft states that most recreational visitors to the area simply sightsee from their vehicles. Only 5 to 10% camp in the watershed and a somewhat lower percentage go on float trips, pan for gold, hike, pick berries, or engage in other types of recreational activities. As stated before, I believe that mining can co-exist with these other activities. It has been my experience, that tourists are interested in mining and that seeing these mines enhances their experiences of the Forty Mile area.

We have lived here many years. We have been mining in the same area for over 16 years. This is a drop in the bucket compared to all of the thousands of acres in the Forty Mile area. All of the operating mines in this area comprise a minimum amount of space in comparison to the amount of land that is in question. Lets put things back into perspective. Reasonable rules and regulations and cooperation on both the mining industry and governing bodies will make mining a viable plus to the states economy.

The final EIS should give the people of the 40 Mile a fighting chance to perserve our way of life, not bring to a hault an industry that is now over 100 years old.

Thank You,

Dianna Kukowski
Box 6
Chicken, Ak 99732

William Walters
2682 Gold Hill Rd
Fairbanks, Ak.
99709

Placer Mining EIS's
Richard Dworsky
B.L.M.

Dear Mr. Dworsky,

I am writing to suppor Alternative C in the Birch Creek, Beaver Creek, and Fortymile River EIS's and Alternative A in the Minto Flats EIS. I particularly wish to urge BLM to insist on control measures that will comply with state and federal water quality standards, preventing loss in Nat'l Wild + Scenic Rivers' water quality, and to protect the interests of subsistence users. The soil and vegetation reclamation in Alternative C is absolutely essential to minimize mining's adverse impact. I also strongly urge BLM to ensure safe fish passage and habitat reclamation.

Thanks for your consideration,

— William Walters

August-10-1988
2:05 PM
FAIRBANKS, ALASKA

Pg I

Dear Sirs: this letter is written in response to the E.I.S. Draft statement for the Forty-mile River.

I dont have the Draft before me at the moment but would like to comment on some specific statements that were in the Draft.

Draft Statement "Dredgers contributed to Peregrine falcons failure to nest in the same location"

I have operated a suction dredge on the Forty mile river since 1980, an have camped and dredged around nesting areas many times.

One summer in particular I witnessed the fledging of two young Peregrine Falcons about 200 vertical feet up the cliffs exactly opposite where I camped and dredged.

They stayed there all summer; the next year they returned to the same nest area.

I dredged down river about 3 river miles from this campground.

672 One day I witness the landing of a helicopter in nesting area of the Peregrine falcons.

I later along with two friends talked to a Federal Goverment Official who stated that they landed there helicopter in the nesting vicinity then climbed to the nest itself. They were doing some research work. He stated the Parent Peregrines were very excited at their intrusion into their nest. This intrusion may have determined the fate of this particular nest for the next year. Nonetheless, in my 10 years of dredging in this part of the River I've always seen Peregrine Falcons.

Draft Statement "River runs basically clear after initial muddy breakup. This is not true. The River drainage area upon receiving enough rainfall ~~the~~ to raise the river two feet in one day gets muddied by the drainages natural enviornment. I've witnessed the River muddy upon raising only a few inches. I've witnessed this muddiness coming out of the Mission Fork

where no mining has taken place. The River will be muddied by these natural rain conditions approximately 20 days in a summer from June thru September.

The 1987 dredge season, I witnessed water quality all summer long the best I've seen it in 10 years of dredging. The miners were controling their water quality discharge that could effect the 40 mile River if no controls were followed.

As a river dredger (outside) there is exactly no ~~[illegible]~~ permanent impact on the bars ~~are~~ and river bottom, the floods ~~smooth~~ out any irregularities.

In respect to camping, all campsites that I've used were left clean. A minimum amount of brush was cleared to enable small tents to occupy the site. These campsites are now natural looking with grass type vegetation covering the area tents had been.

These spots could be utilized by other River enthusiasts -

B4 Thank you, respectfully
Clyde Harold Miles
Box 12
Chicken Alaska
99732

STATE OF ALASKA

OFFICE OF THE GOVERNOR

OFFICE OF MANAGEMENT AND BUDGET
DIVISION OF GOVERNMENTAL COORDINATION

STEVE COWPER, GOVERNOR

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August 10, 1988

Mr. Mike Penfold
State Director
Alaska State Office
Bureau of Land Management
701 C Street, Box 13
Anchorage, AK 99513

Dear Mr. Penfold:

The State of Alaska has reviewed the Bureau of Land Management's (BLM) draft cumulative Environmental Impact Statement (DEIS) for placer mining in the Fortymile River watershed. This letter is a consolidated response on behalf of the state Departments of Commerce and Economic Development, Environmental Conservation, Fish and Game, and Natural Resources.

The BLM has done a good job of assembling data and producing a DEIS in one year. The document is generally well researched and clearly written. A great deal of environmental data, both past and present, was gathered for the DEIS effort. This alone makes the document valuable. We are concerned however, with several apparent inaccuracies regarding subsistence. The state invites the BLM to contact the appropriate state staff to obtain data and discuss these items before the final EIS is prepared. Finally, as with the Beaver and Birch Creek DEISs, we find that the final EIS could be improved by explaining more clearly the reasons for the selection of the Proposed Alternative.

One of the State of Alaska's goals is to ensure that regulatory stability is achieved and a viable placer mining industry is maintained. To achieve this and prevent further impediments to placer mining in Interior Alaska, it is in the interest of the state that the Fortymile River EIS on placer mining is consistent, complete, and complies with the requirements of National Environmental Policy Act and Section 810 of the Alaska National Interest Lands Conservation Act. It is in this spirit that the state offers its comments. Many of the state's comments are technical in nature, either pointing out passages that are not

01-A35LH

clear or else noting areas of apparent inconsistency. We believe these comments will improve and strengthen the DEIS, and thus help guarantee its acceptance by the court.

On behalf of the State of Alaska, thank you for the opportunity to review this DEIS. If I can clarify the state's comments or answer any questions, please do not hesitate to call me or Barbara Sheinberg at 465-3562.

Sincerely,

Jan Caulfield for
Robert L. Grogan
Director

Enclosure

cc w/enc: Commissioner Brady, DNR, Juneau
Commissioner Collinsworth, DFG, Juneau
Commissioner Kelso, DEC, Juneau
Commissioner Smith, DCED, Juneau
Rod Swope, Office of the Governor, Juneau
Dick Dworsky, BLM, Anchorage

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STATE OF ALASKA COMMENTS
ON THE FORTYMILE RIVER
DRAFT ENVIRONMENTAL IMPACT STATEMENT

GENERAL COMMENTS ON FORTYMILE RIVER DEIS

General Concerns

49-1 The State of Alaska notes that the Mosquito Fork drainage, which represents approximately 25 percent of the land area contained in the Fortymile River system, is not addressed in the Bureau of Land Management (BLM) analysis. Although the drainage was excluded from the Sierra Club/BLM lawsuit and District Court injunction, this area probably should be included in the area assessment for cumulative impacts. The water quality data exists for the BLM to complete the required analysis, as Steve Mack and Mary Mauer of Alaska Department of Natural Resources (DNR)/Division of Geological and Geophysical Surveys (DGGS) were contracted by the BLM to collect the necessary data. The Mosquito Fork drainage has two active mines and a number of mining claims. We note that the drainage has always met the state standards for turbidity at the Taylor Highway bridge sampling station.

49-2 It appears that the BLM may have underestimated actual mining activity in the description of alternatives. The state has already received 33 annual placer mining applications for the Fortymile River area on the 1988 field season. This does not include several miners who are not operating due to the lawsuit and injunction. A higher level of mining than was estimated may be occurring, which could change the BLM's analysis and anticipated impacts.

Water Quality Standards

49-3 The discussion of water quality performance standards in the DEIS summary on pages S-5 and S-6 in chapter two, and throughout the document could be improved by being more specific about Environmental Protection Agency (EPA) and Alaska Department of Environmental Conservation (DEC) responsibilities. The DEIS is confusing because it interweaves these two agencies' standards and roles. We are please to note that the water quality standards are more correctly stated under the Proposed Alternative (pages S-3 and S-4). The state suggests that the final EIS be revised so that water quality standards are described clearly in all sections. The following two paragraphs explain EPA and DEC responsibilities more clearly and should be used on pages S-5, S-6, 2-7, 2-9 and other portions of the DEIS where appropriate. These paragraphs also include a description of the EPA's recently promulgated effluent guidelines.

> EPA regulates effluent. The EPA effluent guidelines specify that open-cut mines that process over 1500 cubic yards of ore per year must have a resultant volume of process

wastewater that does not exceed the volume of infiltration, drainage and mine drainage waters that is in excess of the make-up water required for operation. The concentration of pollutants in discharged process wastewater must not exceed an instantaneous maximum settleable solids limit of 0.2 ml/l. Additionally, limits for turbidity and arsenic are provided within the National Pollutant Discharge Elimination System (NPDES) permit.

The ADEC regulates water quality relative to discharges to the lands and waters of the state. The current water quality standards allow no increase in concentration of sediments, including settleable solids, above natural conditions measured below the discharge. Water quality standards for turbidity provide for an increase of 5 Nephelometric Turbidity Units (NTU) above natural conditions as an instantaneous maximum, measured below the discharge. NPDES permits may provide for an increase in the turbidity limit in the effluent based upon expected dilution. The sample is measured in the stream at a point above the confluence of the effluent and the stream. 49-3 cont'd

Alternative C on page S-7 selects water quality performance standards from the EPA effluent guidelines. The sentence that states, "The water quality performance standards for this alternative would be zero ml/l settleable solids and zero NTU turbidity above natural conditions," should be replaced with a more accurate and detailed description as suggested above in the state's comments. (This change should also be made on page 2-11 and anywhere else the EPA effluent guidelines are cited in the DEIS.) Since EPA's final effluent guidelines have been issued, BLM should change the final EIS accordingly. 49-4

In addition, the terms "no discharge," "zero discharge" and "100% recycle" are confused and used interchangeably in the DEIS (page 2-4 and other places). We suggest more clearly defining these distinct terms. Following are the state definitions (ADEC 1987 Annual Mining Report):

> Recycle in placer mining operations is defined as the use of water from one of the settling ponds for the sluicing period. In 100% recycle, all process water used in sluicing is obtained from the settling ponds. Zero discharge is defined as no release of water back into a stream either through a pipe, an overflow or by visible seepage through a dam or tailings filter. Underground flow is considered a discharge if the water quality in the stream is measurably impacted. 49-5

We note that the Fortymile River DEIS does not mention impacts to chemical water quality. The Beaver and Birch Creek DEISs (e.g., Birch Creek DEIS, pages 3-26 and 27) did address this issue. Is the absence of this discussion an oversight? 49-6

Sediment Load

49-7 The discussion on sediment load is confusing. We recommend consistently using either tons/year or tons/day. It is not clear how the sediment load figures were derived. We also recommend that a discussion of sediment transport and alluvial environment be included in the EIS. Finally, field observations yield different sediment load data than that derived from BLM's model. Several questions and areas of confusion are discussed below. We recommend that the sediment load sections be reviewed for accuracy, clarity and consistency.

49-8 It is not clear which water quality performance standards were used in the sediment load modeling. It appears that the model is based on 100% recycle. Further confusion occurs because 100% recycle is not defined. The array of variables used in the model are not apparent. It would appear that the non-point source sediment from the additional access roads and traffic was not considered. We recommend that BLM explicitly state the assumptions, variables and definitions used in the sediment load modeling in the final EIS.

49-9 In the worst case analysis presented for sediment loading (page 4-17, Figure 4-1), the predicted sediment loading rates do not seem to take into account possible enforcement limitations and system upsets that may occur. From the analysis it appears that the water quality projections, based on the alternative mining scenarios, may be optimistic.

The DEIS sediment loading data are presented without a discussion of the sediment transport capacity of the specific alluvial/fluvial environment in question. Depending on sediment transport capacity and actual sediment load, either deposition or scour of a stream bed can occur (Lane, 1955b). The dynamics of a stream system depend on complex relationships of several hydraulic variables including: 1) stream discharge, 2) longitudinal slope, 3) sediment load, 4) resistance of banks and bed to movement of flowing water, 5) vegetation, 6) temperature, 7) geology, and 8) human disturbance. (Heede, 1980). The final EIS should address these issues and consider the alluvial environment downstream. For example, placer mine settling ponds are designed to retain all sediment minus 0.02 mm in size (ADEC). If the alluvial environment downstream has a level of quiescence lower than that of the settling pond, then some of the remaining sediment load could settle out. Without any discussion of the sedimentary environment of the streams in question the DEIS does not relate sediment loading to its possible or assumed environmental consequences.

49-10 Finally, the state notes that while modeling is a useful tool, any model is only as good as the input variables. The projections for sediment loading are apparently based on a static model. It also appears that 100% recycle is used as a water quality performance standard. Thus it is not surprising that the

model's predicted sediment loads are substantially less than what has been previously observed in the field where there are mining operations in various levels of compliance with existing water quality standards. However, it still should be noted that the DEIS model may significantly underestimate total sediment loading from area placer mines if compliance with water quality standards and effluent limits is not achieved. 49-10 cont'd

On page 3-22 in Figure 3-1, we note that the sediment loading model used for the Fortymile DEIS is based upon the same lower 48 EPA assumptions used for the Birch Creek and Beaver Creek DEISs. Please refer to the state's comments on this model contained within our response on the Beaver and Birch Creek DEISs. The model also provides for an open water season of 200 days, while in reality the open water season in interior Alaska is much shorter.

Stream Reclamation

Under the Proposed Alternative and Alternatives A and B (pages S-3, 2-7 and subsequent pages), the DEIS states that the "stream bypass would be stabilized or reinforced to make it the permanent channel" (p. S-3) and "provide for fish passage to comply with Alaska Department of Fish and Game (ADF&G) regulations" (page 2-10). As discussed in the state's comments on the Beaver and Birch Creek DEISs, we are concerned that merely stabilizing a stream bypass can lead to a loss of fish habitat; increased stream velocities and increased channel gradient in reaches where the stream length has been decreased; decreased water depth in reaches where the channel is wider than the natural configuration or where inadequate stream banks confine the stream flow; changes in winter and summer temperature regimes caused by changes in stream flow and exposure; and a lack of habitat features like pools, undercut banks, riffles, and runs that are associated with natural stream channel configurations. (See bibliography attached to the state's comments on the Beaver Creek DEIS for citations.) The BLM in fact, has identified many of these same concerns on pages 4-43 and 4-46. Accordingly, it is not clear why BLM, in the Proposed Alternative and Alternative A and B, proposes that the stream bypass channel remain in place as the permanent stream channel after mining. We recommend this be explained more clearly in the final EIS. 49-11

When BLM considers which alternative it will recommend in the final EIS, please be advised that following completion of mining, the ADF&G normally requires that the original stream characteristics be reestablished in anadromous streams. In resident fish streams (non-anadromous) the ADF&G requires that the streambed and bank be reestablished upon completion of mining activities. We recommend that the final Proposed Alternative include provisions for compliance with ADF&G requirements. By completing appropriate reclamation of the aquatic environment (including the stream bypass channel), a miner can actually improve the environment by enhancing pool-riffle ratios,

overwintering habitat, etc., rather than causing long-term impacts to this environment.

Terrestrial Reclamation

49-12 Under each alternative (pages 3-39, 4-22, figure 4-3 and other places), it is noted that mining related activities will result in unavoidable adverse impacts to riparian wildlife habitats for periods of 30 to 50 years or more. While the state recognizes that short-term impacts will result from riparian land clearing operations, the final EIS should emphasize that with proper reclamation, particularly for such species as moose which prefer early successional vegetation (see Figure 4-3). Specifically, the state notes that with a proper mixture of fines in disturbed gravels, willow growth will not exceed four feet in less than ten years. The ADF&G generally considers willows to be available to wintering moose when the willow height exceeds three feet. The EIS should further emphasize that land clearing activities within climax successional areas (black spruce, permafrost, bog areas) may actually increase available moose winter range following proper reclamation for periods of five to 40 years.

Our observations of a more rapid regrowth of willow vegetation on gravel containing fines emphasizes the importance of a good reclamation plan that includes stacking and respreading organic and inorganic fines. We recommend that all alternatives under the subject DEIS contain provisions to stockpile then replace top soil on recontoured gravel tailings. If replanting is included in the reclamation plan, we suggest that BLM refer to the pamphlet "Field Guide for Streambank Revegetation" by ADF&G, Division of Habitat, Plant Materials Center, and DNR, Division of Parks.

49-13 The DEIS states that there will be an unavoidable loss of moose habitat winter range for 30 to 50 years of 851 acres for the Proposed Alternative (page 2-17), 782 acres for Alternative A (page 2-17), 736 acres for Alternative B (page 2-19) and 621 acres for Alternative C (page 2-20). What factors cause BLM to reach these conclusions? What variables are included? Does this or does it not include the impact from road construction and other mining related activities? As stated above, with proper reclamation moose browse habitat can be restored in five to ten years. Do we thus infer that BLM's figures assume the reclamation performance standard will not be enforced? The final EIS should explain this more clearly.

In summary, the activities of the present small-scale placer mining operations in the Fortymile area are believed to be having limited impacts on terrestrial wildlife populations. However, an escalation in the number of such operations or of larger, year-round operations would be expected to have greater impacts. With greater rehabilitation efforts, even the impacts of present operations at existing levels could be reduced and the beneficial effects of creating more early seral habitats enhanced.

The state is concerned about the incorrect and misleading statements and implications throughout the DEIS regarding reclamation on state land. The DEIS states on page 2-16 (second paragraph) that, "State and private lands would have some local, long-term impacts on the topography since reclamation on these lands is not required." Similar statements are found on pages 4-8, in figure 4-2 under the 'acres reclaimed' column, and in other places in this document. In contrast to these statements, please note that the state routinely requires placer miners to meet the following conditions (per 11 AAC 96.140), that all contribute to reclamation:

° Top soil shall be saved and protected from erosion. No top soil shall be disposed of in natural water bodies. It is suggested that the graded tailings may provide good areas to dispose of top soil which would encourage natural re-vegetation.

° Tailings shall be graded at the close of each season to approximate the surrounding ground contours.

° Activities employing wheeled or tracked vehicles shall be conducted in such a manner as to minimize surface damage.

° Existing roads and trails shall be used whenever possible. Trail widths shall be kept to the minimum necessary. Trail surface my be cleared of timber, stumps, and snags. Due care shall be used to avoid excessive scarring or removal of ground vegetative cover. 49-14

° All activities shall be conducted in a manner that will minimize disturbance of drainage systems, changing the character, polluting, or silting of streams, lakes, ponds, water holes, seeps, and marches, or disturbance of fish and wildlife resources. Cuts, fills, and other activities causing any of the above disturbances, if not repaired immediately, are subject to such corrective action as may be required by the Director.

° The Director of the Division of Mining may prohibit the disturbance of vegetation within 300 feet of any waters located in specially designated areas as prescribed in 11 AAC 96.010(2) except at designated stream crossings.

° Every reasonable effort shall be made to prevent, control, or suppress any fire in the operating area. Uncontrolled fires shall be immediately reported.

° Holes, pits, and excavations shall be filled, plugged, or repaired to the satisfaction of the Director of the Division of Mining. Holes, pits and excavations necessary to verify discovery on prospecting sites, mining claims, and mining leasehold locations may be left open but shall be maintained as required by the Director.

49-14 cont'd In addition, if the placer mine involves a commercial suction dredging operation, the following special stipulations related to reclamation are required:

- Gravel bar tailings shall be maintained in a manner to approximate the surrounding riverbed surface.
- When mining takes place in channels with greater than two feet of water, the tailings shall be submerged at least two feet under water.
- All reclamation is to be completed by the end of each season.
- Hydraulicking of stream banks is prohibited.

The state recommends that the inaccurate statements regarding reclamation on state land on the previously cited pages be corrected in the final EIS.

49-15 The DEIS alternatives have varying estimates of sediment load and channel morphology changes (due to changes in water quality and reclamation performance standards and the predicted number of mines). The degree of impact from each alternative is tied to an assumption that each alternative's stated water quality and reclamation performance standard will be attained. In the DEIS the BLM downplays its enforcement role for water quality. The BLM however, has clear responsibility and enforcement for reclamation. We recommend that BLM specify in the final EIS how it will ensure compliance with the reclamation standards.

Subsistence

49-16 The DEIS tends to either downplay the use of the Fortymile River drainage for subsistence purposes or has drawn limited or inaccurate conclusions on the basis of a limited published literature search. Please see our page specific comments on chapter three and four. The state extends an offer for the BLM staff involved in drafting the subsistence sections of the EIS to consult with the Alaska Department of Fish and Game (ADF&G) Subsistence Division staff to exchange information, and improve the content and accuracy of the sections pertaining to subsistence issues. The final EIS should adequately characterize the role of fish, wildlife, and plant resources in study area communities.

COMMENTS BY PAGE

DEIS Summary

49-17 Page S-5, third paragraph Revisions may be needed to these characterizations of subsistence uses in the Fortymile River drainage, based on our subsistence comments for chapters three and four.

DEIS Chapter One - Purpose and Need for Action

Page 1-6 Add the "General Mining Law of 1872 and the Alaska Interagency Fire Management Plan: Fortymile Area, 1984" to the list of laws that govern management in the Fortymile River area. Also, rather than generally referencing, "other regulations found in the code of federal regulations," we suggest listing these regulations.

Page 1-8, figure 1-2 Specify the applicable State of Alaska regulations as follows:

Agency	Legal Guidelines and Plans for Management	Responsibility of Agency	Enforcement Responsibility of Agency
State of Alaska	AS 16.05.840	Fish Passage	State Standards
	AS 16.05.870	Anadromous Fish	
	AS 46 and 18 AAC 30 31, 50, 60, 62, 64 70-72, 75, 80	Air, Land and Water Quality	
	AS 38.05 and 11 AAC 96.010,030,040, 140	Miscellaneous Land Use	

49-18

Page 1-9, section 1.9 The state commends BLM's decision to let other agencies, including the Corps, use this EIS as a general document for reviewing work in the Fortymile River watershed.

DEIS Chapter Two - Description of Alternatives

Page 2-4 The state recommends that BLM emphasize the distinction between recycle, 100% recycle and zero discharge. These terms represent different thresholds and should not be confused. See the discussion on page two of the state's comments.

In paragraph four, we recommend that rather than using the word "dirty," which has several meanings, substitute the sedimentologically correct term "muddy." "Mud," is a recognized sedimentological term meaning a mixture of sediment particles (including clay, silt), and water (American Geological Institute, 1976) and is the correct term for the context of the DEIS. In addition we recommend that the term "clear" be exchanged for the term "clean." 49-19

Paragraph five on this page discusses seepage. Please note that a seepage discharge is considered an effluent discharge by DEC and EPA and must meet state water quality standards and federal effluent limits.

Page 2-6 and 7, proposed action The use of a stream bypass as the permanent channel should be treated as an option rather than the proposed action. In many areas, it is not reasonable to expect that the bypass channel can be stabilized and remain in place. With failure of the bypass channel, the stream could 49-20

49-20 cont'd overflow unstable areas e.g., reclaimed sediment ponds and erode the trapped sediment. In many areas, reclamation of the former stream channel would be the most advantageous method for site rehabilitation.

49-21 Page 2-10, Figure 2-5 This figure shows the requirements for disposal of human waste as being "keep out of the stream." However, Alaska wastewater disposal regulations (18 AAC 72.021) require a 100 foot setback from surface waters and a four foot separation distance above groundwater, e.g., pit privies. Figure 2-5 should be changed accordingly.

49-22 Page 2-12 It would aid miners and other DEIS reviewers if the proposed mining claim validity examinations to be conducted by Bureau of Land Management (BLM) under Alternative D were described in detail. If this is a lengthy description, we suggest it be included as an appendix.

49-23 Page 2-16, section 2.5.1, third paragraph The DEIS states that, "there should be no significant impacts on mineral resources." The meaning of this sentence is not clear. If our interpretation is correct, we suggest the following revision: "there should be no significant impact on mineral resource development."

Page 2-17, second paragraph The DEIS states that, "there are two to five known Peregrine Falcon breeding pairs in the watershed." If possible, we recommend BLM be more specific on the number of pairs.

Page 2-17, fifth paragraph Revisions may be needed to these characterizations of subsistence uses in the Fortymile River drainage, based on our subsistence comments for chapters three and four.

49-24 Page 2-19 The state supports BLM's efforts to ensure that adequate reclamation is accomplished that will prevent sediment and overburden from continuing to erode and enter streams. However, the projected annual reclamation costs in Alternative A of $17,000 seem low to accomplish implementation of BLM's 3809 regulations.

49-25 Page 2-22, figure 2-7 The estimated percentage of acres of habitat permanently lost when compared with total acres of habitat physically altered for the 1987 mining season is 10 percent. The same comparison for the Proposed Alternative shows that a 20 percent permanent habitat loss. Since reclamation will be required under the Proposed Alternative, as it was in 1987, why are the percentages different?

DEIS Chapter Three - Affected Environment

49-26 Page 3-3 The Birch Creek DEIS had an excellent discussion in the "general considerations and interrelationships among geology,

soils, and sediments" section on surface erosion, mass movement, soil's physical and biologic properties and sedimentation. We were surprised that these informative sections were deleted in the Fortymile River DEIS. We recommend that they be added to the final EIS. Please also refer to our comments on the Birch Creek DEIS regarding the sedimentation section. **49-26 cont'd**

Page 3-23, first paragraph For clarity add, "summer thunderstorms, often totaling 0.5 to 1 inch <u>of precipitation</u> are very common in the region." **49-27**

Page 3-34 The DEIS states that, "often fire has positive benefits," and goes on to describe some of these benefits. The state concurs and suggests that this section could even be further strengthened in the final EIS. Wildfire is a crucially important natural process necessary for nutrient cycling and the maintenance of wildlife habitat diversity and productivity in the Fortymile area. The suppression of early season fires in the Fortymile area in Modified Suppression Areas may have significant adverse environmental effects on riparian habitats for wildlife. When the final EIS is prepared, BLM should consider addressing the habitat impacts associated with the high level of wildfire suppression that the Alaska Interagency Fire Management Plan for the Fortymile Area recommends. **49-28**

Page 3-46, paragraph continued from previous page We are not aware of any use in the lower Tanana River for salmon fishing by either the Upper Tanana or Han Athabaskans. This assertion should either be documented or deleted. Please also note that the important role of whitefish for feeding dogteams among the Upper Tanana Athabaskans, at least since onset of the fur trade era, has been documented in ethnographic literature (e.g., page 566 of the McKennan 1981 reference cited in the DEIS bibliography). **49-29**

Page 3-46, second paragraph Tanacross was not established until well after the Fortymile gold rush.

Page 3-47, end of first paragraph The reference to "Goodrich 1898" is not listed in the bibliography and should be added. **49-30**

Page 3-52, subsistence section, first paragraph No mention is made of the residents of Boundary, Jack Wade, or other outlying locales along the Taylor Highway. While their numbers may be few, they should be acknowledged as residents of the study area. **49-31**

Page 3-52, subsistence section, second paragraph The state notes that the per capita harvest levels of subsistence resources for most of the communities listed are estimates only and should be treated as such. Current research in some study area communities will enable the state to make more precise and data-based estimates in the future. **49-32**

49-33 Page 3-53, current subsistence section The statement, "historically, caribou were hunted in the Fortymile River drainage, but most caribou hunting seems to have shifted to south of the Tanana River, partially in response to the declining population and shifting migration routes of the Fortymile herd (Case 1986, Martin 1986)," is not based on fact. The Fortymile Caribou Herd is the primary source of caribou for most area residents and it does not regularly migrate south of the Tanana River (and when it does, does so only in small numbers). Two ADF&G Division of Subsistence reports are cited in support of this statement, but these reports examine only resource harvest activities in Northway and Dot Lake. This inaccuracy should be corrected in the final EIS.

49-34 Page 3-53, affected subsistence section - caribou The first paragraph contains misleading and inaccurate information. The communities of Tok, Chicken, and Eagle actively pursue Fortymile Herd Caribou in the Fortymile River drainage for subsistence purposes, as do some residents of other area communities. Caribou hunting on the Tetlin Refuge involves only residents of Tetlin and Northway, has occurred intermittently since about 1982, and is a product of either the Nelchina or Mentasta Herd Caribou (or both), having expanded their range. These inaccuracies should be corrected in the final EIS.

49-35 In the second paragraph, the Northway data reported in Case 1986 are based on a relatively small sample of 15 households. The eight Dot Lake and 373 Tok residents reported to have participated in caribou hunting refers only to those persons who pursued Fortymile Herd Caribou in 1984-85.

Page 3-54, affected subsistence section - moose As noted above, the Northway study involved a very small sample size. The state is confident that many more than 13 community households participated in moose hunting in 1983-84, and that more than eight households were successful. The assertion that Tok residents make only "some use" of the Fortymile River drainage for moose hunting requires documentation. We believe that they actively use this area.

As noted above, Case's 1986 Northway Study involved a very small sample size (17 percent of all occupied households - 15 of 88). The numbers presented in the DEIS only reflect survey results, not extrapolated totals for the community as a whole. Furthermore, it should be noted that the survey was non-random. Thus, participation rates may or may not reflect community patterns. Based on subjective field observation and knowledge of local hunting patterns, the state believes that many more than 15 (DEIS incorrectly reported survey totals as 13) community households participated in moose hunting in 1983-84, and that more than eight households were successful. Finally, the assertion that Tok residents make only "some use" of the Fortymile River drainage for moose requires documentation. Subjective observation by ADF&G biologists stationed in Tok suggests significant usage does occur.

Page 3-54, affecting subsistence section - trapping There are inaccuracies in this section as well. Trappers from Tok actively run lines in the Fortymile River drainage. Case's 1986 study (which is referenced) actually says very little about trapping in the Fortymile River drainage. We doubt that muskrat is the most common species harvested in the Fortymile River drainage, although it is harvested in comparatively high numbers by Tetlin and Northway residents outside the study area. Case reported that 11 of 15 Northway households he contacted harvested 863 muskrats in 1984-5. The Caulfield 1983 reference in the DEIS is based on observations and research in the Yukon Flats and should not be used for assessing the value of muskrats to Fortymile River area residents (even then, the Caulfield (page 89) states, "increased prices have reportedly stirred renewed interest in muskrat harvest in recent years," which seems to contradict the BLM interpretation of this source). The final sentence in this section states, "lynx and wolf are present, but apparently rarely trapped (Case 1986)." In fact, the first sentence on page 65 of the Case 1986 study does not support the contention that lynx are pursued "to a lesser extent" than other principal species. These inaccuracies and discrepancies must be resolved in the final EIS. 49-36

Page 3-54, affected subsistence section - fish, second paragraph The final EIS should reference the use of the Copper River area for salmon fishing by some of the study area communities (for further information, see the Haynes et al. 1984 reference cited in the bibliography).

Subsistence Map No. 1 The contents of this map appear to be attributed solely to the Case 1986 study of Northway, although the legend indicates that moose and caribou hunting areas for Chicken and Eagle also are depicted. What is the source of the Chicken and Eagle data? The map appears to underrepresent uses of the Fortymile River drainage for big game hunting, since areas used by Tok residents are not shown. The legend also implies that all data portrayed on this map were derived from the ADF&G Division of Subsistence. This is true only if the Case 1986 Northway report was the only source used. BLM should consult with the state in this regard before the final EIS and maps are prepared. 49-37

Subsistence Map No. 2 This map presents no information for the primary communities which trap in the Fortymile River drainage (Eagle, Chicken, and Tok). The map thus has limited value and should either include information for these communities or be deleted. 49-38

Page 3-55 The reference to "Fortymile Placers 1988" is missing from the bibliography, although the same document for previous years is cited. 49-39

Page 3-56, other resources section No mention is made of plant and/or wood harvesting by residents of Tok and Tanacross from the Fortymile River drainage. No evidence is presented to support 49-40

49-40 cont'd the statement that, "there is no evidence that these resources are affected in any way by mining activities." We recommend that such conclusions not be drawn without citing references and allowing reviewers the opportunity to evaluate the data used in deriving this position.

49-41 Page 3-56, conclusions section The DEIS states, "while the number of people using the area is not high, the subsistence harvest is important to their well-being." How was this conclusion reached? Because Tok is located closer to the Fortymile River drainage, and the Case (1986) study indicates that Northway residents tend to utilize area closer to home, we suspect that Tok residents use the Fortymile River drainage more than Northway residents. Were subsistence uses of the Fortymile River drainage discussed with any local residents in preparation of this DEIS, or has BLM drawn an independent conclusion that placer mining is not significantly impacting subsistence activities?

Page 3-56, next to last paragraph Please note that scheduled and charted air service also are available in Tok and Tetlin.

49-42 Page 3-59, third paragraph This section is misleading in that it does not distinguish between local and non-local hunters. The statement, "the available game was also utilized by approximately 20 local hunters who are centered in Tok," contradicts the information on page 3-53 indicating that 373 residents of Tok hunted Fortymile caribou in 1984-85.

49-43 Page 3-62, fifth paragraph The first sentence should be $46 million not 446 million.

Page 3-63, first full paragraph The DEIS should specify the area(s) of residence of the 102 Alaskans who reside in the Fortymile River basin outside of Chicken.

49-44 Page 3-63, third paragraph For clarity in the second and third sentences, insert the words placer mining before the word "employment."

DEIS Chapter Four - Environmental Consequences

49-45 Page 4-14, third paragraph The DEIS states, "However, available data indicate that the discharge of effluent from active, operating mines and suction dredges does not make a significant contribution to water quality deterioration in the watershed." This statement should be clarified to note that active operating mines and suction dredges do not make a significant contribution to water quality deterioration provided that applicable federal and state wastewater effluent limitations and water quality standards are met.

49-46 Page 4-40, third paragraph We do not believe that mining-induced changes in habitat will necessarily compromise ADF&G objectives to increase moose numbers, as stated in the DEIS. At

the present time, moose populations in the Fortymile River area are being limited at low densities by predation by grizzly bears and wolves rather than by lack of food (Boertje et al. 1987). According to ADF&G surveys, less than five percent of leaders (growth occurring in the current year) are being used each winter by moose. This should be clarified in the final EIS. 49-46 cont'd

Page 4-45 The DEIS states, "in two studies (Weber and Post 1985, ADEC 1986), fish were found in clearwater tributaries of mined streams and in unmined streams, but none were found downstream in streams affected by mining." This statement is incorrect. Weber and Post reported finding fish in clearwater tributaries of mined streams below active mining, in mined streams far downstream of active mining (e.g., Crooked Creek near the confluence of Birch Creek and in Birch Creek below the confluence with Twelvemile Creek), and in unmined creeks. They did not find fish in clearwater tributaries above active mining. (NOTE: These observations were made under variable levels of compliance with applicable federal and state wastewater effluent limitations and water quality standards.) 49-47

Page 4-53, final paragraph This paragraph inaccurately characterizes the level of subsistence activity in the area. What is the basis for asserting that subsistence use of the drainage is "relatively limited" and that only "some" hunting and trapping occurs? The DEIS has not provided evidence to show the actual use levels of the study area. 49-48

Page 4-56, second paragraph What is the basis for the assertion that there is "little subsistence usage ongoing in the Fortymile River drainage?" (See our other comments on subsistence issues.)

Page 4-69 to 71, Figure 4-9 The figure presents a series of potential mitigation options for minimizing potential mining related impacts. To avoid potential confusion, this figure should be clearly labeled as potential options that are not necessary reflected in the proposed action or alternatives. 49-49

Appendix E-2 - Staking and Operating a Federal Mining Claim

Page A-20 Paragraph three describes the process of locating a mining claim, but no mention is made of making a valid mineral discovery. Please note that Federal Law (30 USC 23) and Federal Regulations (43 CFR 3841.3-1) require discovery before location. 49-50

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Weber, P.K., The Use of Chemical Flocculants for Water Clarification: A review of the literature with application to placer mining, ADF&G, Habitat Division, Technical Report No. 86-4, Juneau, 1986, 31 p.

Weber, P.K. and R.A. Post, Aquatic habitat assessments in mined and unmined portions of the Birch Creek watershed, ADF&G Division of Habitat, Tech. Rep. 85-2, Juneau, 1985, 65 p.

49 Continued

49-1 The Mosquito Fork has been incorporated into the analysis and documentation of the Final EIS. See revisions of text, especially Chapters Three and Four.

49-2 The BLM estimates for the 1987 mining activity were based on actual mining operations and not solely on APMAs. Data gathering on the three major EISs indicated that proposed operations outnumbered actual operations by 8 to 35%. In the Beaver Creek drainage, five operations were proposed, but only one actually operated and only for a short period of time. In addition, the draft EIS did not include mining activity on the Mosquito Fork above the Taylor Highway bridge. Operations on Mosquito Fork have been included in the final EIS.

49-3 The additions suggested have been made in Chapters One and Two.

49-4 The BLM has not changed Alternative C to reflect the new EPA effluent guidelines. The fact that EPA has recently selected a slightly different effluent guideline will not significantly change BLM's impact analysis nor will it influence BLM's choice of the Proposed Action. Placer miners will be required to comply with the current effluent guidelines regardless of the guidelines BLM used in evaluating a specific alternative.

49-5 Text in these sections has been clarified. The definition for "zero discharge" and "100% recycle" have been added to the glossary.

49-6 Sections 3.4 and 4.4 have been revised to include discussions on chemical water quality.

49-7 The sediment load figures have been clarified in the Final EIS. The figures in Chapter Three were derived by converting mg/l at a given rate (cubic feet per second) to tons per day. The sediment load for the Proposed Action in Chapter Four was estimated using the methodology described in Appendix E-1. Portions of the Draft EIS concerning sediment load have been revised in the final EIS due to the confusion of several readers.

49-8 The assumptions for determining sediment load are discussed in Appendix E-1. The sediment load was based on acreage disturbed and number of mines, not on water treatment technique (i.e., 100% recycle) or on a performance standard.

49-9 Neither page 4-17 nor Figure 4-1 in the draft EIS present any worst-case information or analysis on sediment loading. The estimated sediment loading rates do not consider enforcement actions; however, the analysis in Section 4.4 assumes that water quality performance standards are met.

49-10 See response to comments 49-7 and 49-8.

49-11 See text revisions, Section 2.3.

49-12 See revisions to Sections 4.5 and 4.6.6.

49-13 Details are presented in Section 4.6.

49-14 The State reclamation requirements have been included as performance standards for State and private mines in Chapter Two. Appropriate changes have been made in Chapters Two and Four regarding reclamation on these lands.

49-15 Section 2.3.1 dicusses the purpose and frequency of compliance inspection. Further details of compliance will be outlined in the ROD.

49-16 Subsistence uses and resources occur in the Fortymile River drainage, and are important to the individuals involved. We are unaware of any "significant restrictions to subsistence uses and needs (see Glossary). BLM has not concluded that NO impacts are occurring, rather impacts are not at a level of significant restriction to subsistence uses and needs, which we specifically define.

49-17 See response 49-16.

49-18 The suggested additions to Figure 1-2 have been incorporated. Section 1.6 has been revised, the General Mining Law has been added to the list of primary legislation affecting the study area.

49-19 The term "dirty" has been changed to "muddy." The term "clean" has not been changed because the subject surface and runoff water may not be "clear."

49-20 See the revised Proposed Action.

49-21 Figure 2-5 has been revised.

49-22 A description of BLM's procedures for conducting validity exams can be found in Bureau Manual 3060.

49-23 Revised accordingly.

49-24 See the reclamation requirements for Alternative A are less than present requirements; therefore the costs should be less also. See Section 2.3.3.

49-25 That figure has been revised (and renumbered as Figure 2-6). The "permanently lost" acreage is the mined land which would remain barren or sparsely vegetated after reclamation and regrowth. The "physically altered" figure includes all lands disturbed by mining for roads, trails, trails, mines and facilities, for the historic use, 1987 use and projected disturbance. The comparison of these two figures would not yield a consistent ratio.

49-26 Such a narrative has been included in the final EIS.

49-27 So added.

49-28 The level of fire suppression is set by the appropriate land management agency for each area. The impacts of fire suppression are addressed in the EISs for each Fire Management Plan.

49-29 Your comments have been incorporated.

49-30 So added.

49-31 Text changed to reflect concern.

49-32 Text changed. We hope that the State's current research becomes available soon. Our analysis was written before the State's material was available.

49-33 Text modified.

49-34 So corrected.

49-35 See revisions to Section 3.9.2.

49-36 See revised text under trapping.

49-37 Map has been changed.

49-38 We acknowledge that the map depicts only one community, but disagree that it should be deleted. Trapping data for other communities using the Fortymile River drainage did not exist at the writing of this report.

49-39 So added.

49-40 Text changed.

49-41 See text revisions and response 49-16.

49-42 Not that Section 3.9 provides data on subsistence hunting; Section 3.10 is concerned strictly with sport hunting.

49-43 Text has been changed.

49-44 So changed.

49-45 See revisions to Section 4.4.

49-46 See revised text, Section 4.6.6.

49-47 See revised text.

49-48 See revised text. Chapter 3 provides a realistic picture of subsistence uses and needs.

49-49 Figure 4-9 in the Draft EIS has been deleted from the final EIS. Section 4.12 clearly states that the mitigating measures presented are potential actions, and that specific measures will be adopted after a site-specific EA is completed.

49-50 Discovery is required to perfect the possessory right of the locator, i.e., for a claim to be considered valid; however discovery need not always precede location, per the doctrine of *pedis possessio*. See Maley 1985, page 370, for a synopsis of a U.S. Supreme Court opinion on this matter.

To: BLM
Regarding: Environmental Impact Study on the 40-Mile Mining District.

This letter is in response to your E.I.S. report on the 40-mile Drainage.

As for my knowledge of the area, I've dredged for gold on the main river for 8 years. I've also jet boated the river uncountable times and have floated it a handful of times. I've also hiked, 3-wheeled, motorcycled, snow-machined, and 4-wheel driven oodles of trails and access roads and visited dozens of mining operations. I've also camped all along the main river for months at a time. In fact, I know so much about the area, I'm surprised you didn't consult me as a source of information for your E.I.S. study.

The first booboo that was made was declaring the 40 Mile River "wild and scenic". Anyone with half a brain and any knowledge what-so-ever of the area would realize that it has been a MINING DISTRICT long before you were a glimmer in your mommies eye. There's old mining towns, abandon cabin and equipment, plus several bridges, which even me, a miner, would not even consider to be "wild and scenic", and I'm sure the rafters wouldn't either. So from what I can see, if your going to attempt to even come close to having a that river fit that description, your going to have to ban mining and tear down all man-made structures to accomplish the task.

As for minings impact on the area, it's been a very, very small price to pay when you consider that the whole area would never be accessible to the general public. None of your highways that run through the area would exist because they all lead to mining towns, which of coarse owe their existence to mining. None of the mine access roads, trails, or landing strips would exist either. Imagine some weekend rafter trying to lug their equipment through miles of mosquito choked swamps and over hill after hill just to float down a river! You would have to charter a helicopter and fly in if you could afford it!

As for us muddying up the water, I should be the first to complain, because a dredger needs fairly clean water to see what he/she's doing. I am for recirculating the sluice water whenever practical or possible, but I've had that lovely experience of almost being totally wiped out by mother nature when she has a bladder problem. I,ve never had a problem floating or boating the 40-Mile River because of mining, but when mother nature dumps a load, usually two or three times a year, all hell breaks loose. Stumps, logs, and anything else that she can get her hot little hands on, gets flushed down the river causing far more damage than any mining operation. As for tailing piles and regrowth, yes, I think they should be contoured if they pose an impediment

to travel. There's 300 foot cliffs of barren, desolated rock along the 40-Mile which doesn't seem to stop hikers and rafters, at least I've never heard any complaints about them, so why should anyone bitch about tailing piles? As for regrowth, there's thousands of acres of avalanches, barren rocky cliffs, and ice and water scoured river banks that are just as unsightly and pittyly as tailing piles. As for muddy water affecting fish quality, mother nature would have haplessly murdered them eons ago with her bank scouring, river bottom bulldozing, floods,and ice jams. If I can catch Grayling right behind my dredge while it's in operation, or for that matter pull salmon out of the muddy Yukon or Copper rivers, a little mud is not going to affect fishing. As for noise from dreadging or cat mining operations, yes, they should be muffled to cut obnoxious, raspy noise to a minimum. My dredge is Volkswagen powered with a factory bus muffler, which then goes into a resonator and then into an exhaust-water copper coiled heat exchanger. And, yes, I think that all camps along the river should be out of sight, but it sounds like the Sierra Club wants to enjoy our tent camps by keeping you from assigning long term camping permits thus forcing us to clutter the river banks. In fact, the Sierra Club has no choice, because if high water threatens my camp, I will move up to higher ground, even if it is against the law.

Even if we were to mine 1,000 acres a year, it would take 3,100 years to mine the whole drainage, and by then 99% of the area would be revegitated or possible covered by glaciers!

Instead of wasting my hard earned tax dollars on trying to put me out of business, you should sue the Sierra Club for harassment and for the spread of unemployment!

Just a few facts and opinions from someone who has seen it all first hand.

Sincerely,
Brett Murphy
Brett Murphy

p.s. Just remember that if it wasn't for mining, you and everyone you know would be out of a job and huddled around a fire, in a cave, wondering were your next meal was going to come from.

COMMENTS 40-MILE EIS

Variances on water quality should be allowed as to the conditions on each individual creek + mining operation.

Earl L Schene
Uhler Creek

BLM AK SO 07?A
Aug 12 8 07 AM '88

W. H. DINKINS
845 Smallwood Trail
Fairbanks, Alaska 99712

august 9, 1988

Mr. Richard Dworsky
BLM

Dear Sir
my wife and I have been frequent recreational users over the last twenty years of Birch creek, Beaver creek the Fortymile River and Minto Flats. We are distressed by the environmental degradation of these areas by what at best is marginal economic placer mining operations.

Reviewing proposed current EIS we wish to go on record as favoring alternative C in the Birch creek, Beaver creek and Fortymile R. areas alternative A in the Minto Flats area. It would be very short sighted to accept less than full water pollution control standards to protect these State and National treasures. Subsistence users especially need these protection measures.

Sincerely!

Joyce Dinkins Hal Dinkins

David & Patty Pearson
Gen. Del.
Chicken, AK. 99732

August 8, 1988

Richard Dworsky
Bureau of Land Management
701 C Street, Box 13
Anchorage, AK. 99513

Subject: Written Comment - Fortymile EIS

Dear Sir:

You must agree if you are knowledgeable of mining, that most miners are respectful of the environment. Jim Sisk reported at the Public Meeting, August 3, at Chicken, that he had issued only 7 or 8 violations of EPA Standards for water quality in the past 6 years (which is slightly over 1 per year).

As far as fish habitat is concerned, most suction dredgers can tell you stories of the large quantities of fish that feed behind their sluice boxes. The loosening of gravel by the suction dredge has been proven in studies to be of benefit to fish for spawing and feeding.

There is far less suction dredging

in the rivers now than was in 1982 and the activity is decreasing each year. The need for reinstatement of long-term camping is very necessary for obvious reasons. Up until October, 1987, BLM had a very regulated long-term camping policy. Even though it was strict, the miners complied and the camps were "accepted as manageable elements" and "the use found to be of minimal impact" (See pages A-9, 10, 11). Most of the camps of State mining claimants who camp on federally managed land are virtually invisable by "floaters". The denial of use of federal land for camping would force the miners to set up their lodgings on floats or barrels at the waters edge. We feel this would have a much larger impact (visually) to the river. As for the negative impact to wildlife, as indicated in this Draft Cumulative, many animals are seen passing through and around these camps daily.

We as miners can live with Alternative A (page S-5) as long as there is no mention of numbers of mines involved. Also, due to weather conditions, none of these mines work "Continuously", so it is unnecessary to incorporate that word in this study. Along with the water quality performance standard of 0.2 ml/l of settleable solids and 5NTU turbidity when measured 1000 feet (instead of 500 feet) below the mine discharge point.

We suggest that representatives from the Fortymile Mining District be present to review the material for the final EIS before it is put together. Some of those involved in comprising this draft have admitted to never even visited the Fortymile area before. We feel therefore since they are not knowledgeable of the subject, they are not qualified to have imput in this study.

53 Continued

In that many miners to this date have not even received a copy of this Draft Cumulative which deeply affects their lives, the time limit for their comments should be extended.

It is an historically known fact that without miners and trappers there would be no Taylor Highway. It was miners and trappers who made way for settlement west of the Rockies. Without them there would be no BLM or Sierra Club in the western United States. Now it is they (the miners) not the flora and fauna who have become the most endangered species of all. There is no thought given here to human rights or the pride these people have in their work of the land.

What kind of Government agency or so called "honorable" judge would allow some whining special interest group" to fill them with false infor-

mation to destroy the lives and livelihood of good people who love the land of this great Country of ours?

We suggest that in the formation of the final EIS, you take under consideration the words printed at the bottom of your own letterhead: Public Lands U.S.A.: Use, Share, Appreciate

Sincerely,

David & Patty Pearson

For winter correspondence please mail to:
P.O. Box 446
Palo Cedro, CA. 96073

BLM AK SO 974A

Aug 12 1 51 AM '88

8-10-88

Mr. Dworsky,

I think that the draft EIS on the 40-Mile fails because it does not adequately analyze or evaluate the cumulative impacts of placer-mining on water quality. (This should be stressed & emphasized, not just quickly gone over.)

Water quality samples were collected in 1987 & the stream quality was excellent. The water quality data shows that mining had no cumulative impact. I want the final EIS to state this clearly & often, as water quality is of the highest priority. The data does exist for a better analysis.

The EIS (draft) gives the impression that everyone is going around making their trails into all-weather trails. Very few trails get used year-round. Most trails are used "as is" and have been used as such without further improvement for 20 years or more. I want the final EIS to state clearly that the majority of trails put in by

miners are used 3 months or less per year. The state hwy covers a lot more acreage than our little trails.

On page 3-22 is a chart comparing sediment loads. I think it's extremely unfair for you to use data & methodologys that aren't specific for the 40-Mile District. The way the chart reads leads everyone to believe the data came from the 40-Mile, where in the appendix (A-18) it says this data "does not specifically represent Alaska". Also, I want it noted that our discharge goes through treatment, as in settling ponds

I want it clearly stated in the final EIS that actual sluicing is only a few days per season. For example, at our mine we may sluice 15-20 days per year, but most of those days are only 4 or 5 hour days.

Everyone seems to agree that reclaimation

3

costs in the draft EIS are way too low. We put a lot of money + effort into reclamation.

You said that fish habitat in Chicken Creek is eliminated due to cementation. For one thing, "eliminated" is too strong a word because there are fish in Chicken Creek. Also, according to Fish + Game (Alaska Department of) there are not many fish in Chicken Creek due to low flows.

I want to say again that we want it emphasized that water quality in the 40-Mile is good. The draft EIS does not use the biological + chemical data that was collected during 1987, and we want that data included in the final.

I think that the alternatives in the final EIS should allow for past + future variances granted by the EPA.

I believe the draft EIS is wrong +

Y

negligent when it states that "moose habitat will be severely impaired for up to 50 yrs". Willow is a major food for moose, so the EIS contradicts itself when it says on 3-34 that they noted "tall willows aged 17 years on tailings that are 30 yrs old". Also on 3-32 it says "recently disturbed gravel bars & tailings support sparse shrub communities, usually willow, birch & aspen". Willows are rapidly growing plants that are more a part of the successional stages rather than than the climax community that existed before mining, so if anything we are creating moose habitat.

As a whole, the mining community works hard to do what is expected of us. We treat our water with settling ponds, etc. and we do our reclamation. All we ask is that the expectations placed upon us be reasonable & humanly possible.

sincerely,

Robin Hammond

Robin Hammond

Robin Hammond
Chicken, Ak. 99732

August 10, 1988

Richard Dworsky
BLM
701 C street, Box 13
Anchorage, AK 99513

BLM AK SO
AUG 12 1 51 AM '88

Re: Birch Creek, Beaver Creek, Fortymile River, and Minto Flats Placer Mining EIS's.

Dear Mr. Dworsky,

I support strong environmental protections for placer mines operating on federal lands in Alaska. Miners have a right to mine, but they don't have a right to degrade the water quality for downstream users or leave unreclaimed land in their wake. Reclamation should be done on a time schedule that calls for recovery of soils and vegetation within 25 years and specific plans should be implemented to minimize non-point source pollution runoff after the mine has been closed down.

I would like you to support Alternative C for Birch, Beaver and the Fortymile and Alternative A for Minto Flats. And all water quality standards for controlling pollution should be in full compliance with both state and federal water quality standards. Do not allow the quality of any National Wild and Scenic Rivers to be degraded below their existing levels.

I also request that you do all you can to ensure safe passage for fish through mine sites during operations and reolamation of fish habitat be a priority.

Thank you for this opportunity to comment.

Sincerely,

J Stratton

Jim Stratton
P.O. BOX 101034
Anchorage, AK 99510

ALASKA MINERS ASSOCIATION, INC.

501 W. Northern Lights Blvd., Suite 203, Anchorage, AK 99503 (907) 276-0347

I.4.D.1.

AUG 12 2 01 AM '88

BLM AK SO

August 10, 1988

Forty Mile River EIS
% Richard Dworsky
Bureau of Land Management
701 C Street
Box 13
Anchorage, AK. 99513

The Alaska Miners Association is a industry association made up of over 1000 members representing Placer Mining, Hard Rock Miners, Coal producers and Gravel operators as well as supporting industries.

We have completed a review of the 40 mile draft EIS and offer the following comments.

Mining has been part of the 40 Mile for the past ninety years with very intensive operations including several communities (Franklin and Forty-Mile) in the past. It is significant to note that the impact of thousands of miners did not result in any loss of other natural values in the Forty-Mile, but rather contributed to the general public interest, rich history and culture of that area.

Mining has not destroyed or even altered in any substantial way the terrestrial habitats. This can be proven by calculating the area distributed and permanently removed from wildlife production over the last 80 years and estimating the productive capacity of these lands in terms of wildlife populations.

The Alaska Miners Association supports the proposed alternative and find the analysis which supports this alternative to be sound.

DEC data is now available showing water quality in the 40 Mile which achieves state water quality standards. There is no reason to assume that this may change. National Effluent Guidelines issued by EPA now set a standard. Settlable solids must be removed from processed water through the use of settling ponds, recycle is required and discharge to compensate for ground water or run off in flow must meet state turbidity standards. We know from the historical perspective when there were major mining activities and thousands of people in the 40 mile that the impact of this activities on aquatic resources was short lived if indeed existing at all.

ALASKA MINERS ASSOCIATION, INC.

Forty-Mile River EIS
% Richard Dworsky
August 10, 1988
Page Two

The cumulative effects should be recognized as a known impact and categorized a non-existing. There may not be a great deal of quantitative data to establish this conclusion, but logic as well as inference certainly show that there were no cumulative impacts from the historic mining.

The EIS should recognize that mining is a temporary use of the land. Since minerals are a non-renewable resource once they are removed the land is available for other uses. Roads, campsites or areas occupied by other facilities are also temporary. Therefore, their impacts are short-term. For example, what is the now current existing environmental impact of the old communities of Franklin or Forty Mile?

The existence of mining enhances visitor interest. This can be planned into the total land management program for the area. In addition mining plans for 3 - 5 years should be encouraged. This will help plan orderly reclamation in conjunction with annual mining operations. 56-1

The DEIS is well done and the proposed alternative should be adopted. Increasing permitting activities by the Federal and State agencies will guarantee protection of all the values in the area.

Curt McVee

Curt McVee
Executive Director
Alaska Miners Association

cm:le

56-1 The BLM presently encourages miners to submit multi-year mining plans.

COMMENTS ON FORTYMILE RIVER
PLACER MINING DRAFT CUMULATIVE
ENVIRONMENTAL IMPACT STATEMENT

August 12, 1988

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INTRODUCTION

Pacific Legal Foundation is a nonprofit public interest law foundation, based in Sacramento, California, with a branch office in Anchorage, Alaska. PLF has over 20,000 supporters throughout the United States and has the primary purpose of litigating in the public interest and in the defense of individual freedoms, private property rights, and the free enterprise system. PLF attorneys have represented the Alaska Miners Association and Miners Advocacy Council in litigation involving the Bureau of Land Management's (BLM) regulation of placer mining on lands administered by BLM. Because of the importance of placer mining to the rural Alaskan economy, PLF makes the following comments on the draft cumulative environmental impact statement (EIS) on the Fortymile River watershed.

GENERAL COMMENTS

PLF commends BLM for its timely and professional production of the Fortymile River Placer Mining Draft Cumulative Environmental Impact Statement (DEIS). It represents a thorough analysis of cumulative environmental impacts from placer mining. PLF supports the proposed alternative because it will engender the least adverse impact upon the miners and the people in the Fortymile River area with a concomitant insignificant impact upon the environmental resources of the area. PLF believes that the analysis in the DEIS is sound, and that the

57 Continued

DEIS is in full compliance with the District Court's order and the National Environmental Policy Act (NEPA).

SPECIFIC COMMENTS

A. Summary Section, Consequences

Pages S-4 to S-5: The statement on Page S-4 that "discharge from active mines and suction dredging activity would not make a significant contribution to water quality deterioration" is fully supported by the experience of the miners and data collected by the regulatory agencies. Over the past several years many miners in the region have witnessed a dramatic improvement in water quality as part of an effort of miners to meet water quality standards. With the new effluent guidelines of the Environmental Protection Agency (EPA) and those of Alaska Department of Environmental Conservation (ADEC), there is every reason to believe that the impacts on water quality will be even less significant in future years.

The contribution from nonpoint sources is also not likely to be significant because of the limited land area impacted by mining operations and the increasingly stringent controls on mining practices from agencies like BLM, EPA, Army Corps of Engineers (Corps), and so on.

As far as the effect of mining on "candidate" endangered or threatened species and on three endemic species, it should be apparent that the limited scope of mining activities under any of the DEIS alternatives will render any such effects insignificant.

57-1 On Page S-5 mention is made of "streams that are blocked to fish passage." Under current regulatory practices, especially those of the Corps and the Alaska Department of Fish and Game, miners are not permitted to block streams to fish passage. Through flood events, it is anticipated that any old blockages to fish passage will be eliminated over time.

The DEIS states that the "overall cumulative effect of total suspended sediment and turbidity increases in the Fortymile River drainage cannot be determined." DEIS at S-5. However, under current regulatory practices, especially those of EPA, there will be no significant adverse cumulative effects.

The conclusion that "there is no evidence that the cumulative effect of mining in the Fortymile River drainage is causing a significant negative impact on water quality as related to subsistence" is fully supported by the experience of the miners and other residents in the Fortymile River drainage area.

57-2 It is stated that "increased mining would decrease perception of a wild landscape unaffected by humans." DEIS at S-5. Many of the streams in the area are not "wild" rivers, but instead are "scenic" rivers which have been affected by humans for decades. In any event, because of the substantial historical mining in the region, it is not likely that present or future mining will really have any significant additional effect on the wild character of the river.

The DEIS estimate that future mining expenditures would increase by about 23% is probably overly optimistic. See discussion below for Page 2-15.

Alternatives

Pages S-5 to S-9: The discussion of Alternatives A and B and the proposed alternative notes that water quality performance standards would be at the current EPA/ADEC standards. BLM should be aware, however, that all these standards are currently in a state of limbo because EPA has granted evidentiary hearings on all of these issues, and has suspended many existing permits until the hearings are completed.

BLM should also be aware that certain superficial similarities exist between the zero discharge standard for Alternative C and EPA's recently promulgated national effluent guidelines. PLF, however, believes that Alternative C is unacceptable because it likely would be far more stringent than any existing or contemplated future regulations, and would create an undue hardship on many miners. The Alaska mining industry has already been decimated several times over by the regulatory onslaught from the state and federal governments. There can be no justification for any action that will further harm the few remaining miners operating within interior Alaska.

Alternative D is totally unacceptable. It is objectionable for philosophical, legal, constitutional, and moral bases. Philosophically, it is abhorrent to the principle that the government should encourage rather than destroy free

enterprise. Legally the alternative is contrary to a plethora of existing federal mining and public land laws and regulations.

In addition to violating the statutes and regulations, the no mining alternative would constitute a taking of property rights under which compensation is required by the Fifth Amendment to the United States Constitution.

On March 15, 1988, President Reagan issued Executive Order 12630, "Governmental Action and Interference With Constitutionally Protected Property Rights." This order pertains to federal actions, such as "governmental actions physically invading or occupying private property, or other policy statements or actions related to federal regulation or direct physical invasion or occupancy" of private property.

Alternative D clearly will have a dramatic effect on private property. The Executive Order states quite plainly that "[b]efore undertaking any proposed action regulating private property use for the protection of public health or safety, the Executive Department or agency involved shall, in internal deliberative documents and any submissions to the Director of the Office of Management and Budget that are required" identify and analyze the effects that such federal actions will have on private property. If Alternative D is adopted the EIS must incorporate such an analysis.

Finally, Alternative D is objectionable because it would destroy the lives and livelihoods of many small family miners in rural Alaska. It would represent a highly unbalanced

57 Continued

and draconian approach to environmental protection and would not be in the public interest. We have already witnessed the destruction of some mining communities within Alaska's national parks. The results have been unfortunate and should not be repeated on BLM lands.

Mosquito Fork

Should the final environmental impact statement reiterate the information on Mosquito Fork which was reviewed in the course of past and present litigation? The highlights of those reports are: With regard to Mosquito Fork, the Alaska Department of Environmental Conservation, Tok District Office, in January, 1985, published a report entitled "1984 Fortymile Mining District Annual Report" which outlined the mining claims and water quality testing along the entire Fortymile drainage. In the case of Sierra Club v. Penfold, that document was attached as Exhibit 22 to the Sierra Club's motion in support of a preliminary injunction. It summarizes the results of 58 inspections made at 25 mines in the Fortymile mining district during 1984, and reports: 57-3

> "The Mosquito Fork had three periods of high water with associated elevated turbidities. Upstream mining operations did not appear to impact the river as turbidity values were less than 10 ntus, except during runoff conditions. River height and turbidity values were closely related." Id. at 4.

There were four mines on Mosquito Fork upstream from the Taylor Highway at Milepost 64.

In the "1985 Fortymile Mining District Annual Report," published by the Alaska Department of Environmental Conservation and used as Exhibit 24 by the Sierra Club for their motion for a preliminary injunction, 23 inspections were made at 31 different mines in the Fortymile mining district. "Ambient turbidity concentrations on the Mosquito Fork, South Fork and Walker Fork above Wade Creek were within the water quality standards." _Id._ at 1. In 1985 there were four mines and several section dredgers operating on the Mosquito Fork above the Taylor Highway Bridge at Milepost 64. _Id._ at 3. As is typical of most interior Alaska streams, water levels fluctuate dramatically during the summer. As Peter E. K. Sheppard notes in his report on "Relationship of Environmental Change to the Minto Flats Subsistence Resource Base" prepared for United States Department of Interior, Bureau of Land Management, Alaska (Dec. 21, 1987), the diverse mosaic of plant associations found in the flood plains of interior Alaska are primarily a result of periodic fire and flooding. This cycle of alternating high and low water is one of the major factors affecting the regulation of natural processes in the area. Persistent flooding of some habitats allow for the maintenance of specialized plant associations and the wildlife dependent on those plants. Thus in the tabulations of turbidity and water quality done by the Alaska Department of Environmental Conservation, there is always a corresponding measurement of

river height. See for example attached Appendix 2 from the 1985 Fortymile Mining District Annual Report at 14. Placer miners do not add to the volume of water in a stream nor increase river height. Snow melt and increased rainfall do. In the chart attached, with regard to Mosquito Fork, you will note that during what would normally be the heavy mining season from the end of July until the end of August, turbidity is at its lowest point for the summer. In early summer when snow is melting quickly, the highest turbidity is recorded when the river crested at six foot on about June 25; turbidity was measured at 23 NTUs. Turbidity dropped gradually between June 25 and July 1, and then continued to drop dramatically as the river height dropped. In the 1985 testing, except for the typical spring flood periods when NTU was increased as a result of the flooding, turbidity on the Mosquito Fork did not exceed 5 NTUs after July 9, 1985 until the last testing in the end of September.

For an even more dramatic comparison of the change in turbidity related to the change in river height, see the attached table for the 1984 test results on Mosquito Fork. Compare that table to the 1985 table. During 1985 the highest turbidity measured was 23 NTUs. During 1984 the highest turbidity measurement was 210 NTUs when the river crested at seven feet (a foot higher than its crest in 1984). Or compare the change in NTUs between August 22 and August 27. A dramatic increase from 3.5 NTUs to 22 NTUs corresponds to a dramatic rise in river height of 1.5 feet within a weeks time.

Data like the above supports the findings of Steven F. Mack, Mary A. Moorman, and Linda Harris of the Alaska Division of Geological and Geophysical Surveys, "Water Quality and Discharge Data From Selected Sites in the Fortymile and Tolovana Drainages, Summer, 1987" published in December of 1987 (and also used as a trial exhibit by the Sierra Club) which concludes, "flood events were still responsible for most of the sediment load" for the Tolovana and Fortymile drainages. Id. at 20. Independant testing by said authors supports ADEC's studies. "In general, turbidity at all sites in the Fortymile drainage was low. ... [t]he relatively high initial levels [of NTUs] correspond with the high water levels that existed at all sites when we started monitoring in mid July. For the rest of the summer at only Jack Wade Creek and Walker Fork were turbidity levels above 5 NTU at any time." Id. at 16. These tests were done in 1987.

In its injunction for the Fortymile drainage, the district court recognized that mining on the Mosquito Fork did not have any adverse effect on the environment. Turbidity standards are being met and there is no evidence or data that demonstrates any environmental harm from mining in the Mosquito Fork. It naturally follows, therefore, that mining in the Mosquito Fork cannot have any adverse effects in downstream areas. If there is no mining related turbidity being generated in the Mosqito Fork, there certainly can be none carried downstream into the Fortymile.

Although the DEIS did not expressly address the issue of the Mosquito Fork, it should be apparent to everybody reviewing the DEIS that there is no contribution to cumulative or synergistic environmental effects from mining on the Mosquito Fork drainage. Although it is not necessary that the DEIS actually address the nonexistence of environmental harms on the Mosquito Fork it would be useful if the final EIS at least makes some mention of the fact that there is no data that demonstrates cumulative environmental harm from mining on the Mosquito Fork drainage. This way, all the public will have been fully apprised of the reasons behind the District Court's exclusion of this area from consideration. 57-4

CHAPTER 1
PURPOSE AND NEED FOR ACTION

Land Status

Page 1-4: The DEIS notes on Page 1-4 that "BLM has no clear authority or jurisdiction to regulate" suction dredging activities on navigable waterways. This statement is entirely correct and for this reason BLM is acting properly in not addressing alternatives that would interfere with the state's regulation of suction dredging operations on the beds of navigable streams.

CHAPTER 2
DESCRIPTION OF ALTERNATIVES

Inspections and Bonding

Page 2-6: PLF fully supports BLM policy of requiring bonds for those miners not willing to comply with BLM's surface

mining regulations. PLF also strongly agrees with the policy of not requiring bonds unless there is an established record of noncompliance. Bonds are expensive, and virtually impossible for many placer miners in Alaska to obtain. They would add just one more cost to mining operations and would make more miners go out of business without any demonstrable increase in environmental benefit.

Proposed Alternative

Pages 2-7 to 2-9: The proposed alternative represents a proper balance between environmental protection and the need to maintain a viable mining industry. While some of the environmental standards are probably more stringent than necessary, and while there will be significant expenses incurred by some miners to comply with this proposal, it represents an adequate compromise between the potential range of alternatives.

Alternative A

Page 2-9: This alternative would disallow EPA variances and not require topsoil saving. The disallowance of EPA variances, assuming that EPA went along with the proposal, would work an unjustified hardship on many miners. EPA regulations ought to be tailored to site specifics, and the variance process can achieve this goal. Otherwise the flexibility of the Clean Water Act would be ignored and miners would suffer for no environmentally justifiable reason.

In addition, it should be noted that where it is practical most miners do not object to saving topsoil. While it

57 Continued

does add to the costs of mining operations, where the saving and respreading of topsoil is practical, miners are anxious to be good neighbors and do what is necessary to properly reclaim the land.

Alternative B

Page 2-11: Alternative B would not allow EPA variances, and is unacceptable for the same reasons discussed under Alternative A above.

Alternative C

Pages 2-11 to 2-12: The proposed zero settleable solids and turbidity standard for this alternative is highly impractical. It does not recognize that in many situations it is impossible to achieve zero discharge because of groundwater infiltration into settling pond systems can often be significant. That is why under EPA's new effluent guidelines, some discharge is still permitted so long as it meets water quality standards. Miners believe that the expense of EPA's zero discharge system has been grossly underestimated, and are working on preparing comments for EPA on its economic analysis. 57-5

The suggested reclamation emphasis on "naturally-appearing landscape configuration" is misplaced. The primary emphasis should be on practical erosion control and prevention. With natural regrowth of vegetation, the mines will easily blend into the surrounding landscape in a relatively short period of time. Furthermore, because much of the Fortymile River drainage 57-6

has been previously mined, the impacts on landscape have already happened, and future mining impact will not be significant.

57-7 The suggestion that fine sediments be removed from settling ponds is not practical because of the difficulty in extracting the muck out of the ponds. In fact the proposal is probably a prescription for miners to get heavy equipment stuck in the settling ponds and for spreading the muck around in areas more subject to surface erosion than the ponds.

57-8 By and large "selective seeding" and fertilization is unnecessary because of the rapid regrowth of grasses and other vegetation in properly reclaimed areas. No known data demonstrates any significant benefits from fertilization of reclaimed placer mines under Alaskan conditions. In addition the costs of transporting fertilizer, which would contribute its own pollution to the watershed, could be too high to justify.

Finally, the construction of fish habitat in the limited areas affected by mining would probably not add a significant amount of habitat to the total fish habitat of the region, but it would add substantial costs to mining operations. The economics of this alternative should be further explored before it is seriously suggested for the miners.

Alternative D

Pages 2-12 to 2-13: For the reasons discussed in the summary section above, Alternative D is totally unacceptable and warrants no further comment.

Alternatives Considered, But
Eliminated From Further Analysis

Pages 2-13 to 2-14: It is stated on Page 2-14 that the removal of the Fortymile River from wild and or scenic designation was not considered because it would require an act of Congress or the State of Alaska. It is the position of many miners that the Fortymile should never have been placed in wild and scenic status in the first place and should be removed. Just because legislation would be required is not an impediment from discussing this option in the EIS. In fact, it is suggested that BLM seriously consider making this recommendation to Congress.

Subchapter 2-5
Summary of Environmental Consequences

Projection of Mines

Page 2-15: The estimate of a $600 per ounce price of gold and a 23% increase in mining activity is probably too optimistic (optimistic from a miner's point of view that is). With the trend towards increasingly stringent regulations from the Corps, EPA, and state agencies, it is doubtful this level can be achieved. There is also the distinct possibility that existing ore bodies will be mined out. This factor combined with restrictions on new locations and regulatory disincentives to mining means that the number of new mines may not be able to keep pace with those which close down due to orebody exhaustion.

For these reasons, BLM's estimate of a 23% increase may overemphasize any environmental impacts from this scenario. Nevertheless, to avoid charges that it has underestimated the

57 Continued

reasonable number of mining operations, BLM should continue its analysis with this number of mines. The same considerations apply to the estimates of mine numbers for the other alternatives.

Proposed Action (Status Quo)

Pages 2-16 to 2-18: There will be no significant adverse environmental consequences from the proposed alternative.

The DEIS states that the effects of mining on several species of endangered plants are unknown. However, considering the limited area extent of mining, and the large amount of previous mining in the watershed that has not destroyed these plants, it should be safe to assume that continued limited mining will not have an adverse effect on these species.

57-9 On Page 2-17 it is stated that there could be a low to moderate reduction in moose population potential. This conclusion is questionable because as mining areas are reclaimed and regrowth occurs there will be new areas of habitat created. This section continues by stating that "the potential exists for long-term cumulative adverse effects to wildlife if mining activity, suction dredging disturbances, and human use of the area increases greatly in crucial wildlife habitats." Id. So long as mining is discouraged under the present regulatory framework of the state and federal governments, this scenario is not likely.

Experience of miners and others supports the conclusion that "'mining at current levels and as currently practiced [in 1987] has little influence on physical parameters in the basin' (Dames & Moore 1988)." Id.

Alternatives A, B, and C

Pages 2-18 to 2-20: Each Alternative under A, B, and C discusses the impact to riparian habitat and the low to moderate reduction in moose potential. What is the total percentage of disturbed acreage for these catagories to the total acreage in the Fortymile drainage? It is suggested that the areas actually disturbed will be insignificant in comparison. Alternative C notes that 621 acres of moose habitat could be affected. No specific numbers however are given for Alternatives A and B. 57-10

Alternative D

Pages 2-21 to 2-24: As discussed previously, Alternative D is unacceptable. However, it is possible that this alternative would result in increased mining pressure on state and private claims and on the state owned bed of the navigable waterways. Such concentration of mining effects into a smaller area could have an adverse environmental effect. On Page 2-24 it is stated that there would be a reduction in 391 acres of habitat resulting in a "low to moderate reduction in moose population potential." How could the reduction of a mere 391 acres possibly constitute a "moderate" reduction? 57-11

Worst Case Analysis

Page 2-25: Figure 2-8 contains a summary of a worst case scenario. Other agencies probably have informed BLM that the Council on Environmental Quality regulations calling for a worst case analysis were replaced in 1986. See 40 C.F.R. 1502.22 (1987). However, BLM should not eliminate its worst case analysis. Recent decisions from the Ninth Circuit Court of Appeals have ignored the regulatory change and stated that worst case analyses are still required. See Oregon Natural Resources Council v. Marsh, 820 F.2d 1051, 1058 n.8 (9th Cir. 1987); and Methow Valley Citizens Council v. Regional Forester, 833 F.2d 810, 817-18 (9th Cir. 1987). Although these decisions are being appealed, and ought to be reversed, BLM should nonetheless be cognizant that the worst case analysis requirement is not yet properly dead.

Chapter 3

Affected Environment

Introduction 3-1

57-12 On Page 3-1 it is noted that the effect of the proposals on wilderness were not discussed because there are no wilderness resources within the affected area. It is suggested that this statement be expanded slightly to demonstrate that there are no potential wilderness areas and the mining would not affect any such potential wilderness areas even if they existed.

Mining in the Study Area

Pages 3-15 to 3-18: It is noted that on Page 3-15 it is stated that mining activity was renewed in the late 1970's and early 1980's due to gold's increased value. It must be presumed that Congress was aware of this trend when the Alaska National Interest Lands Conservation Act was passed in 1981. Therefore, the status quo should be acceptable because Congress did not dictate any reduction in existing mining activities in the Fortymile.

It is further stated on this page that the "enforcement of mining water discharge standards was nonexistent or minimal at best." The DEIS should expressly note that this is no longer the case. 57-13

Wildlife

Pages 3-36 to 3-39: On Page 3-36 the discussion leads to the conclusion that since the 1970's the caribou population has increased from 5,000 to the current estimate of 16,500. Coincidentally, this occurred during the same period in which there was an increase in mining activity. Compare Page 3-36 to Page 3-15. This should lead to the conclusion that mining has absolutely no detrimental effect on caribou population trends. In fact, mining may have a beneficial effect if the correlation is anything but coincidental. On Page 3-37 the reduction of moose habitat from placer mining in Walker Fork, Wade Creek, and the vicinity of Chicken is discussed. Oftentimes, miners change the habitat in areas that are originally poor moose habitat into 57-14

57-14 cont'd better habitat once natural reclamation proceeds. This would be apparent, for example, in an area where black spruce bog and permafrost are replaced by well drained gravel rich soils with abundant shrub vegetation. Yet, on Page 3-39 it is stated that mining activities have "probably contributed to a low level reduction in moose population potential." It is more likely that the coincidence occurring here is an old conflict for territory between moose and caribou. The increased numbers of caribou reflect better caribou habitat, which likely reduces moose habitat. Like miners and the Sierra Club, moose and caribou seem to have conflicting and competing interests. See, e.g., United States Department of Interior, Bureau of Land Management "Fortymile Planning Unit-Unit Resource Analysis", at 1-4 and 25 (1976).

57-15 What is the percentage of habitat lost to the total habitat in the Fortymile River drainage? And what are the number of moose lost compared to the total number of moose in the drainage during the period of time in which mining has increased? Increases or decreases in the moose or caribou poplulations are probably correctly attributable to many factors and to a combination of those factors. Which include snow depth, range condition, fire, predator density, hunting pressure, and land use. In the November 2, 1984 BLM report entitled "Proposed Resource Management Plan-Final Environmental Impact Statement for the Steese National Conservation Area", the government had concluded that reduced moose populations were probably directly related to past wildfire suppression activities:

> "Moose populations in the area are low. Moose habitat is dominated by spruce forests with stands of willow along rivers and creeks which provide winter brouse. Quantity and quality of moose range has been reduced by past wildfire suppression activities." Id. at 101.

That report recommended that "prescribed fire affects would result in long-term habitat improvement. Short-term air quality and visibility degredation would occur because of smoke." Id. at 136. Since the time of that 1984 proposal if the government has engaged in controlled burns to improve moose habitat in the area, then surface slumping and sedimentation of streams are common results of this thermal disruption and can affect even flat terrain. Such controlled burns would alter the vegetative mats and release the rich silt when the permafrost melts. Moose habitat would improve but stream water quality would deteriorate short-term. Throughout interior Alaska wildfires and flooding create and recreate the flood plain alluvium, swamp deposits, and boreal forests and wetlands. This is an area where the flooding causes constantly changing stream channels. Every change in the channel means more silt deposited in the stream as new stream banks are eroded. For example, the 1967 flood inundated Fairbanks in mud and silt and changed the course of many streams. There is probably no accurate way to measure "natural siltation" in these streams. The stream

siltation depends on how hot the weather is, how fast the ice thaws, catastrophic flooding, annual flooding, wildfires, all adding a complacated set of variables which point to the fact that "natural" to interior Alaska means constantly changing conditions and a kaleidoscope of wildlife and plant variations which will continue to change as the area emerges from a glacial age.

Threatened and Endangered Species

57-16 Pages 3-39 to 3-40: On Page 3-39 it is suggested that "suction dredges in proximity to a peregrine falcon nest may have contributed to nesting failure." This conclusion is not supported. Furthermore, it is contrary to recent evidence that peregrine falcon are not adversely affected by noises. Indeed, some peregrine falcon have even been found nesting in urban areas in the lower 48 states. Finally, it is stated on Page 3-40 that the number of breeding pairs in Alaska "have come close to historic levels." This is evidence that stringent restrictions on airplane height and mining activities in the vicinity of peregrine nests may not be at all necessary in the Fortymile River drainage.

Discussion

57-17 Pages 3-51 to 3-52: On Page 3-52, the DEIS claims that "mining practices are much more destructive than early day techniques." This is not accurate. For example, a description of early mining practices on Page 3-49 discusses hot water and steam thawing systems. The discussion on Page 3-51 of hydraulic

stripping certainly leads to the conclusion that past mining activities were equally if not more destructive than current ones. This is especially the case with existing environmental and reclamation standards. 57-17 cont'd

Recreational/Visual Resources

Pages 3-56 to 3-60: On Page 3-57 the DEIS notes that "recreational boating use is low, probably under 250 visitor days per year." Two hundred and fifty visitor days per year is an insignificant number compared to the miner days spent in the Fortymile drainage per year. For suction dredging alone, it has been estimated that there are between 30 and 35 miners operating. Because they operate on the average of a minimum of 60 days per year that would mean a total of 1,800 suction dredge days compared to 250 boater days on the Fortymile. With other miners and support personnel added in it becomes apparent that recreational visitation is far less important to the Fortymile area than the mining activities are.

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

Geology and Topography, Alternative D

Page 4-4: It is not necessarily the case that there will be less of an impact to geology and topography from Alternative D because once miners are thrown out of work they will be unable to perform reclamation activities on existing mining operations.

Mineral Resources

57-18 Pages 4-5 to 4-6: Any discussion of mineral resources should include a discussion of the inevitable exhaustion of the existing resources through mining. Such exhaustion should be viewed as a positive benefit from mining because it places the commodity into the economic resource stream. The argument that we should be "saving the resources for future generations" is totally specious because those resources would not likely become available to future generations under current trends. There is also absolutely no way to predict future resource needs. Who could have predicted the growth of demand for rare earth minerals just a few decades ago? It should also be noted that unlike many mineral commodities only a small percentage of gold, generally less then 5%, is actually consumptively used on an annual basis. The rest is retained as jewelry and government stockpiles.

Soils--Special Considerations

Page 4-10: Under the proposed alternative the complete alteration of approximately 851 acres of soil profile by mining operations is predicted. This is utterly insignificant compared to the total area of the Fortymile drainage.

Water Resources

57-19 Pages 4-11 to 4-18: EPA has found that when settleable solid standards are met there are concomitant reductions in metal concentrations. Therefore, the conclusion of Mack, cited on Page 4-11 that "chromium, mercury, iron, and pH were found to

exceed water quality standards" is indeed curious. It would appear that the natural background in these areas could contribute to these metals and pH rather then any effect from mining operations. This should be discussed, especially in light of the 1982 Dames and Moore study, also cited on Page 4-11. 57-19 cont'd

On Page 4-13 the DEIS states that "increased levels of turbidity would occur on all actively mined streams ... thus impacting primary productivity." This is not likely under current EPA effluent guidelines and the increased enforcement by EPA and the state of Alaska.

What is the basis for the statement that "natural restitution of the stream channel may never occur" found on Page 4-13? In the conclusion on Page 4-14 it is stated that "meaningful predictions of impacts from turbidity and the sedimentation of the streambed are not possible." BLM should expressly note that the data for such conclusions is not available, and is not reasonably obtainable. 57-20

Landcover

Pages 4-18 to 4-26: In all of the alternatives discussed it is stated that a certain amount of acreage would be permanently barren. Permanence, of course, is a relative term because nothing will be permanent in the course of a long enough period of time. In any event, none of the suggested total acres of "lost" ground appears significant when compared to the total number of acres of habitat in the Fortymile River drainage. 57-21

Wildlife

57-22 Pages 4-27 to 4-40: For each on of the alternatives the loss of wildlife habitat is discussed. For example, under the proposed action it would be 1051 acres, Alternatives A and B would have a loss of 915 acres, Alternative C, 767 acres, and Alternative D, 705 acres. These acreages should be compared to the total acreage of habitat in the Fortymile drainage and a percentage figure placed on the loss. It will thus become clear that the losses are extremely insignificant under each one of the alternatives. And many acres are now being restored and reclaimed or improved by miners.

Threatened and Endangered Fauna

57-23 Pages 4-40 to 4-42: On Page 4-41 protective measures for peregrine falcon are discussed. However, because the DEIS has previously stated that peregrine falcon were approaching historical levels in interior Alaska, it is questionable whether or not the peregrine falcon recovery plan is really necessary when it would interfere with legitimate mining activities. In addition, the prohibition of activities site that have high noise levels within two miles of a nest is contrary to experience where peregrine falcons have been found nesting in urban areas.

Fisheries

57-24 Pages 4-42 to 4-49: On Page 4-44 the DEIS states that turbid conditions reduce light penetration and reduce primary productivity. However, turbid conditions may also add to the phosphorus and organic loading in a stream thereby increasing

food and potential primary activity. This potential should be recognized. 57-24 cont'd

On page 4-45 the DEIS states that "eggs exposed on the surface of the substrate are susceptible to smothering by sediment deposition from mining activities." In many areas it is doubtful that this is a significant factor because of the strict standards on settleable solids that are being met by the overwhelming number of miners in all of the interior Alaska drainages. In addition, the hydrology of many stream beds in the Alaskan interior is such that ground water flows up through the river bed into the stream channel thereby cleansing some of the spawning habitat.

On page 4-46 it is stated that "concentrations of arsenic, copper, led, mercury, or other trace metals would increase in areas downstream of mining activities." This in contrary to the conclusions of the EPA that when settleable solid standards are met so too are standards for these other metals. 57-25

Economics

Pages 4-65 to 4-67: As discussed above the projection for the total number of mines over the next decade under the proposed action is probably too optimistic. As also discussed, the economic impacts from alternative D are totally unacceptable.

CONCLUSION

Overall BLM has done an outstanding job in preparation of its DEIS. It fully considers the necessary detail the consequences of its continued regulation of placer mining in the

Fortymile River drainage. The proposed alternative is plainly the preferable one. While the proposed alternative approximates the status quo, the public should recognize nevertheless that the environment of the Fortymile River area will progressively improve. It will improve because of the increasingly aggressive regulation and inspection by EPA, Corps of Engineers, State of Alaska, and last but not least the Bureau of Land Management.

DATED: August 12, 1988.

Respectfully submitted,

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57 Continued

APPENDIX 2

TURBIDITY VALUES, IN NTU'S, AND RIVER HEIGHTS IN FEET, AT
SELECTED FORTYMILE STREAM STATIONS DURING 1984.

MONTH	MAY		JUNE				JULY			AUGUST			SEPTEMBER	
DAY	21	29	4	21	9	11	16-17	30	6	22	27	4	10	19
STATION														
WEST FORK OF THE DENISON	3.9* (3.75)	2.2 (3.5)	2.4 (4)	4.5 (4)	2.4 (3.25)	11 (4.25)	9.5 (4.25)	24 (5.75)	3.3 (3.5)	3 (3)	9.2 (3.5)	10 (4)	10 (4.75)	6.5 (3.5)
MOSQUITO FORK	17 (5.25)	4.2 (4.5)	5.5 (4.5)	9 (5.5)	5.4 (4)	210 (7)	10 (5)	25 (6)	5.8 (4)	3.5 (3)	22 (4.5)	12 (4.5)	8.5 (4.5)	4.3 (4)
SOUTH FORK	19 (7)	10 (5.5)	9.8 (6.75)	14 (7.5)	14 (5.5)	89 (8.5)	70 (8.75)	31 (8.75)	7.0 (5.25)	8.2 (4)	15 (6)	15 (6.5)	10 (7.25)	5.5 (6)
WALKER FORK BELOW WADE CREEK	21 (4)	5.5 (3.75)	8.7 (3.5)	14 (3.5)	9.5 (3.5)	90 (7.5)	105 (6)	22 (4)	24 (3)	160 (2.5)	22 (4.5)	63 (4.5)	28 (4.5)	25 (4)
WALKER FORK ABOVE WADE CREEK	12	3.3	7.5	3.7	10	103	72	19	18	6.7	25	58	9	7.5
WADE CREEK	88	21	170	610	22	1300	270	33	20	950	36	78	180	200

* Turbidity values are listed first. River heights are in parenthesis.

57 Continued

APPENDIX 2

TURBIDITY VALUES, IN NTU'S, AND RIVER HEIGHTS IN FEET, AT
SELECTED FORTYMILE STREAM STATIONS DURING 1985

MONTH	JUNE			JULY			AUGUST			SEPTEMBER		
DAY	5	17	25	1	9	23	15	20	29	3	10	19
STATION												
WEST FORK	NTU* 1.5 (3.5)	2.5 (3.75)	4 (4.25)	5 (4.5)	1.3 (3.0)	1.7 (3.25)	2 (3.0)	1.7 (2.75)	4.2 (3.5)	3.4 (3.0)	9.8 (4.0)	4.1 (3.5)
MOSQUITO FORK	14 (3.0)	6 (5.0)	23 (6.0)	7.5 (6.0)	5.1 (4.0)	2.0 (3.5)	2 (3.0)	1.8 (2.5)	4.5 (3.0)	3.3 (3.0)	5.0 (4.0)	5.0 (4.0)
SOUTH FORK	17 (7.0)	3.8 (6.75)	16 (8.0)	12 (8.0)	8.8 (4.75)	3.6 (5.0)	3 (4.0)	2.5 (4.0)	4.4 (5.25)	3.8 (5.0)	11 (6.75)	5.8 (6.0)
W[illegible]R FORK	75 (6.75)	12 (6.0)	21 (6.5)	36 (5.5)	160 (4.25)	5.2 (5.0)	76 (5.0)	25 (5.0)	44 (5.5)	75 (5.5)	96 (6.0)	4.7 (6.0)
JACK WADE CREEK	97	62	78	300	280	45	1160	160	460	840	370	8.7
WALKER FORK ABOVE ABOVE WADE CREEK	78	3.5	EST 10	4	120	2.5	4.8	17	4.7	5.5	56	3.5

* TURBIDITY VALUES ARE LISTED FIRST. RIVER HEIGHTS ARE IN PARENTHESIS.

APPENDIX 2

TURBIDITY VALUES, IN NTU'S, AND RIVER HEIGHTS IN FEET, AT
SELECTED FORTYMILE STREAM STATIONS DURING 1985

MONTH	JUNE			JULY			AUGUST			SEPTEMBER		
DAY	5	17	25	1	9	23	15	20	29	3	10	19
<u>STATION</u>												
WEST FORK	NTU* 1.5 (3.5)	2.5 (3.75)	4 (4.25)	5 (4.5)	1.3 (3.0)	1.7 (3.25)	2 (3.0)	1.7 (2.75)	4.2 (3.5)	3.4 (3.0)	9.8 (4.0)	4.1 (3.5)
MOSQUITO FORK	14 (3.0)	6 (5.0)	23 (6.0)	7.5 (6.0)	5.1 (4.0)	2.0 (3.5)	2 (3.0)	1.8 (2.5)	4.5 (3.0)	3.3 (3.0)	5.0 (4.0)	5.0 (4.0)
SOUTH FORK	17 (7.0)	3.8 (6.75)	16 (8.0)	12 (8.0)	8.8 (4.75)	3.6 (5.0)	3 (4.0)	2.5 (4.0)	4.4 (5.25)	3.8 (5.0)	11 (6.75)	5.8 (6.0)
[illegible]R FORK	75 (6.75)	12 (6.0)	21 (6.5)	36 (5.5)	160 (4.25)	5.2 (5.0)	76 (5.0)	25 (5.0)	44 (5.5)	75 (5.5)	96 (6.0)	4.7 (6.0)
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* TURBIDITY VALUES ARE LISTED FIRST. RIVER HEIGHTS ARE IN PARENTHESIS.

APPENDIX 4

TURBIDITY VALUES, IN NTU'S, AND RIVER HEIGHTS IN FEET, AT SELECTED FORTYMILE STREAM STATIONS DURING 1984.

MONTH	MAY		JUNE			JULY			AUGUST			SEPTEMBER		
DAY	21	29	4	21	9	11	16-17	30	6	22	27	4	10	19
STATION														
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MOSQUITO FORK	17 (5.25)	4.2 (4.5)	5.5 (4.5)	9 (5.5)	5.4 (4)	210 (7)	10 (5)	25 (6)	5.8 (4)	3.5 (3)	22 (4.5)	12 (4.5)	8.5 (4.5)	4.3 (4)
SOUTH FORK	19 (7)	10 (5.5)	9.8 (6.75)	14 (7.5)	14 (5.5)	89 (8.5)	70 (6.75)	31 (8.75)	7.8 (5.25)	8.2 (4)	15 (6)	15 (6.5)	10 (7.25)	5.5 (6)
WALKER FORK BELOW WADE CREEK	21 (4)	5.5 (3.75)	8.7 (3.5)	34 (3.5)	9.5 (3.5)	90 (7.5)	105 (6)	22 (4)	24 (3)	160 (2.5)	22 (4.5)	63 (4.5)	28 (4.5)	25 (4)
WALKER FORK ABOVE WADE CREEK	12	3.3	7.5	3.7	10	103	72	19	18	6.7	25	58	9	7.5
WADE CREEK	88	21	170	610	22	1300	270	33	20	950	36	78	180	200

* Turbidity values are listed first. River heights are in parenthesis.

57-1 This paragraph has been revised and clarified.

57-2 See text revisions.

57-3 The final EIS includes cumulative impact analysis of mining on the Mosquito Fork above the Taylor Highway bridge.

57-4 See response 57-3.

57-5 The water quality performance standards for Alternative C, zero ml/l settleable solids and turbidity of zero NTU above natural conditions, were chosen because these standards represented the maximum restrictions possible for the discharge of mine effluent. The BLM fully realized that these standards were just one set of several that were being considered by EPA for final effluent guidelines; nevertheless, BLM chose to evaluate the maximum level of water quality standards. EPA's selection of standards different than those analyzed in Alternative C will not impact BLM's selection of a Proposed Action, since BLM does not regulate or enforce effluent guidelines or water quality standards.

57-6 BLM analyzed a range of standards for reclamation of tailings. Stabilization of tailings to prevent erosion is evaluated under Alternative A. Mining in areas which have been historically mined will result in reclamation of old tailings.

57-7 See revisions to Proposed Action. In some cases, the removal of captured fine sediment may be appropriate and practical.

57-8 Fertilization is an option which may be employed in some areas to enhance revegetation. Its primary use would be for areas with little or no organic material available to spread on mineral soil.

57-9 See revised text; Section 4.6.6, Short-Term Uses vs Long-Term Productivity.

57-10 Lack of data prevented the suggested analysis, see Figure 2-6.

57-11 See Sections 4.6.5 and 4.6.6 for additional clarification of this potential effect.

57-12 "Wilderness" as used on page 3-1 refers to Wilderness Areas legally designated by Congress. Areas with wild characteristics may occur in the Fortymile drainage, but these evaluations have not yet been made.

57-13 The statement on enforcement of water discharge standards refers to State and EPA enforcement actions in the late 1970's and early 1980's. The State presently enforces these standards at a much greater level, with its primary focus on Special Priority Streams.

57-14 See revisions to Section 4.6.6.

57-15 Refer to response 57-10.

57-16 Extensive monitoring of peregrine within the Fortymile River watershed suggest that human activities may interfere with nesting success. Peregrines born and raised in Interior Alaska cannot be compared to urban born peregrine young.

57-17 Hydraulic stripping is generally less destructive to fossil specimens than is cat mining, as indicated in Section 3.8.4.

57-18 We agree, see Section 4.2.

57-19 A comment reflecting EPA's finding has been added to the text.

57-20 See revisions to text.

57-21 Refer to response 57-10.

57-22 Refer to response 57-10 and 57-14.

57-23 Refer to response 57-16.

57-24 Fish can benefit from the addition of phosphorous only if phosphorous is absorbed into an organism that the fish (grayling) feeds upon. Invertebrates such as grubs or worms may be fed upon if they can be seen within the processed water.

57-25 See revisions to text.

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August 9, 1988

Mr. Richard Dworsky
Bureau of Land Management
701 C Street, Box 13
Anchorage, Alaska 99513

Re: Comments on Fortymile River Draft EIS

Dear Mr. Dworsky:

The following comments on the draft Fortymile River EIS are submitted on behalf of the Sierra Club, The Wilderness Society, the Northern Alaska Environmental Center, the Birch Creek Village Council, and the Minto Village Council. They are intended to supplement whatever specific comments these groups submit in their individual capacities.

In general, the Fortymile River draft EIS is in many respects an inadequate document. The problems with it will be discussed below but they are substantial enough that BLM should correct them and incorporate the results into a new draft EIS.

I. *The Proposed Action is Unlawful*

One of the worst problems with this EIS is that the proposed action does not meet the legal requirements established in several sources.

A. *The Proposed Action Does Not Prevent Unnecessary and Undue Degradation*

One of BLM's fundamental obligations is to prevent unnecessary or undue degradation of the public lands. 43 U.S.C. § 1732(b). The definition of "undue and unnecessary degradation" in the BLM regulations includes the requirement that all mines "comply with applicable environmental protection statutes and regulations," 43 C.F.R. § 3809.0-5(k), including "Federal and State water quality standards." *Id.* § 3809.2-2(b). But the record shows that will not occur here. 58-1

Under the proposed action, mining would continue as it was conducted in 1987 and the same water quality performance standards would be applicable. Yet in recent years, the water in the Fortymile River drainage has not always met the state's water quality standards. For example, in 1986 turbidity values were not within the state standards. EIS at 3-25. In 1987, turbidity levels also exceeded the 5 NTU level on Jack Wade Creek and Walker Fork, EIS at 3-27, even though the number of operating mines there was lower than in previous years and the miners

58-1 cont'd who did operate on Jack Wade Creek used 100% recycling systems. Alaska Department of Environmental Conservation, *1987 Annual Mining Report* at 19 (Mar. 1988). Therefore, the proposed alternative would allow existing unnecessary and undue degradation to continue -- which is just what BLM is not supposed to do.

58-2 The proposed action would also produce unnecessary or undue degradation because it would allow mines to violate the new EPA effluent limitations. Under the proposed alternative, BLM proposes to allow simple settling as a method of pollution control. The EPA effluent limitations, however, require recirculation of process water for all regulated mines. 40 C.F.R. pt. 440 (promulgated May 9, 1988). This allowed violation of the EPA regulation is itself unlawful and is an unnecessary and undue degradation which must be corrected in the next draft EIS.

B. *The Proposed Action Violates the Natural Wild and Scenic Rivers Act*

58-3 Under the proposed action, a number of impacts to the water quality of the Fortymile River would occur:

> water quality would probably be worse than the conditions that existed during the 1987 mining season due to the projected increase in the number of operations. ... [C]ompliance with the turbidity standard would not be achieved due to variances. ... Increased levels of turbidity would occur on all actively mined streams, ... Turbidity would probably be detectable downstream on Fortymile River for the entire mining season.

EIS at 4-13,14. However, these impacts are contrary to the policy of the National Wild and Scenic Rivers Act -- namely, to preserve selected rivers "in their free-flowing condition to protect the water quality of such rivers and to fulfill other vital national conservation purposes." 16 U.S.C. § 1271. These impacts (and the other related adverse impacts allowed under the proposed alternative) also violate BLM's duty to "take such action ... as may be necessary to protect such rivers...." 16 U.S.C. § 1283(a).

C. *The Proposed Action Does Not Include Required Reclamation*

58-4 Another legal problem relates to reclamation. The proposed action requires a miner to reclaim an area only by stabilizing soils and the creek channel. Revegetation and restoration would be "natural." EIS at 2-7. Alternative C requires restoration to a naturally-appearing landscape configuration, rehabilitation of creek channels, respreading of fines over tailings, fertilizing and reseeding with native species. EIS at 2-10, 11. As a result, the EIS concludes that alternative C "would result in more rapid regrowth of the riparian vegetation[,] ... reduce the amount of non-point sedimentation[,] ... [and] could minimize the long-term impacts to fish habitat. *Id.* at 4-48.

BLM's regulations require "rehabilitation of fisheries habitat." 43 C.F.R. §3809.1-3(d)(4)(iv). Because alternative C is the only alternative that requires any

efforts to rehabilitate habitat, it is the only alternative that satisfies § 3809.1-3(d)(4)(iv). 58-4 cont'd

D. *The Proposed Action Violates BLM Management Plan*

The proposed plan does not meet the goals and objectives required by the river management plan for the Fortymile River. Management objectives in the river management plan include: "(p)reserve the river and its immediate environment and its existing primitive setting ...., (p)revent degradation of water quality ...., (m)aintain and improve fish and wildlife habitat." BLM *River Management Plan-Fortymile River* at 31 (1983). Yet these objectives will not be met by the proposed action in the EIS either. For example, "[u]navoidable adverse impacts are short to long-term increases in suspended sediment and turbidity, accelerated erosion from disturbed areas resulting in a secondary increase in sediment introduced to the stream system, and changes in channel morphology in the vicinity of the disturbed area." EIS at 4-19. Fish habitat would also deteriorate: 58-5

> The direct effects of mining operations would be habitat degradation due to physical alteration and possible blockage of fish migration. ...
> Mining activities will reduce primary productivity in areas affected by increased suspended sediment and turbidity. ...
> ....
> Stream segments directly affected by mining operations are not expected to support arctic grayling or other species during and shortly after mining. ... The combined effect of the mining operation would at least partially eliminate grayling from the mined reaches of the stream. ... Habitat suitability in the streams affected by mining would be poor due to increased toxic metals concentrations, reduced food supply, reduced cover and refuge habitat, and reduced visibility for feeding.

EIS at 4-46, 47.

The next EIS should present a proposed action which will meet the objectives of BLM's management plan for the area.

II. *The EIS Does Not Adequately Address Key Issues*

A. *The Discussion of Cumulative Impacts is Inadequate*

BLM was ordered by the court to prepare "an adequate Environmental Impact Statement ... studying any cumulative or synergistic environmental effects of placer mining within the Birch Creek Watershed ...." *Sierra Club v. Penfold* 644 F.Supp. 1299, 1313 (D. Alaska 1987). However, for most effects of placer mining, the EIS simply does not address cumulative impacts. 58-6

For example, two of the primary cumulative impacts of placer mining are increased turbidity and sedimentation, but even these critical impacts are not analyzed cumulatively. Thus, there is only extremely superficial analysis in the EIS of how high turbidity totals might reach or what their effects might be. Indeed,

the EIS even admits that it does not address the points that the court said it should. Instead, it is filled with concessions that key points will not be determined, such as the following:

- "The overall cumulative adverse effect of total suspended sediment and turbidity increases in the Fortymile River drainage cannot be determined." EIS at S-5.

- "Physical alteration of streams and increases in suspended sediment from mines in the basin would result in unknown cumulative effects on the aquatic resources." *Id.*

- "The contribution of sediment from non-point sources is unknown and cannot be adequately quantified with existing data, ..." EIS at 2-16.

- "Meaningful predictions of impacts from turbidity and the sedimentation of the streambed are not possible." EIS at 4-14.

Likewise, there are many other areas of cumulative impacts that are not analyzed in the EIS, but instead are dismissed on the ground that BLM does not have adequate information. For example:

58-6 cont'd

- "Little or no data is [sic] available for location of crucial use areas, population numbers, trends, productivity or survival of grizzly bear, black bear, or wolves. Similarly, specific data on population size, trend, productivity, and use areas for raptors..., furbearers, and the small and non-game species is [sic] also lacking. EIS at 3-37.

- "The contribution that the Fortymile River fishery may contribute to commercial and subsistence users is not known; therefore, economic values are also unknown." EIS at 3-42.

- "It is not known what percentage of a particular soil type within the basin will be affected." EIS at 4-8.

- The degree of impact from indirect impacts to water quality from accelerated erosion in unknown. EIS at 4-12.

- "There is no information in the current literature on the production of sediments from roads and trails in the basin." EIS at 4-13.

- "[T]he potential unavoidable loss of endemic plant habitat due to mining in the Fortymile River watershed is unknown." EIS at 4-27.

- "The sensitivities of arctic grayling and other organisms [to trace metals] are not well known, the speciation of some of the metals is not known, the degree of tolerance of the local organisms is unquantified, and the proportion of metals that is biologically available versus that which is totally recoverable is unknown." EIS at 4-42.

- "The limited and sometimes conflicting data available on invertebrate and fish populations are not sufficient to determine if impacts of placer mining are significant in the Fortymile River Basin." EIS at 4-45. 58-6 cont'd

In other words, even though the primary purpose of the EIS was to consider and include cumulative impacts, it has not yet been done.

B. *The EIS is Inadequate in Breadth and Depth*

This wholesale failure to analyzed key issues is not just a violation of the court order. It is also contrary to basic NEPA principle. It is black letter law that an EIS must discuss all relevant environmental impacts. 40 C.F.R. § 1502.16(d). Yet this is not done when, as here, the EIS dismisses large areas on key environmental impacts with claims that they cannot be determined.

In addition, the analysis is contrary to the missing-information regulation, which provides that when missing information is "relevant to reasonably foreseeable significant adverse impacts" and "essential to a reasoned choice among alternatives," the information must be included (unless the costs of obtaining it are exorbitant or the means to obtain it are not known). 40 C.F.R. § 1502.22. Here the missing information is both relevant and essential. Therefore, more information needs to be presented in the next EIS to fill the many gaps in the present analysis. 58-7

C. *Mosquito Forks Impacts Must Be Considered*

The EIS does not consider the impacts of Mosquito Fork mining on the Fortymile River. *See* EIS at 1-3 and maps following 1-3. However, the injunction is to remain in place until these impacts have been studied and included within an EIS. *Sierra Club v. Penfold*, 664 F. Supp. 1299, 1315 (D.Alaska 1987). The next draft EIS must include information about Mosquito Fork mining and its effects upon the Fortymile River. 58-8

III. *BLM Must Examine A Wider Range of Alternatives*

Under NEPA, the consideration of alternatives is "the heart" of an environmental impact statement. 40 C.F.R. § 1502.14. So important is their consideration, in fact, that "the existence of a viable but unexamined alternative renders an environmental impact statement inadequate." *Citizens for a Better Henderson v. Hodel*, 768 F.2d 1051, 1057 (9th Cir. 1985). Nonetheless, the EIS violates this fundamental rule in many ways. 58-9

A. *Alternatives that Set Levels for Maximum Permissible Cumulative Impacts*

First of all, BLM ignores the alternative of setting maximum limits to the total level of pollution or degree of impact allowed within the whole drainage (and each tributary segment) for each potential impact. Under this approach, the 58-10

cumulative effect of mining on the whole drainage could best be monitored and controlled. As the ceilings or "bubble" levels were approached, new operations would be prohibited unless current operations reduced their impact sufficiently to make room for them.

The kind of ceiling that would be appropriate is analogous to ones established under different circumstances in the Clean Water Act. Just as that Act requires the establishment of a total maximum daily load for some pollutants in some waters, 33 U.S.C. § 1313(d)(1)(C), so BLM could (and should) establish maximum pollutant levels for the Fortymile River. In a similar vein, BLM should also establish other bubbles for other kinds of adverse impacts, such as bubbles for total acreage of riparian or aquatic habitat disturbed.

The need for maximum ceilings is also acknowledged in the General Management Principles for wild and scenic rivers. Studies must be done to assess the "carrying capacity" of total use that the river can tolerate:

58-10 cont'd

> Studies will be made during preparation of the management plan and periodically thereafter to determine the quantity and mixture of recreation and other public use which can be permitted without adverse impact on the resource values of the river area. Management of the river are can then be planned accordingly.

47 Fed. Reg. 39459 (1982). These studies need to be done for the wild and scenic sections of the Fortymile River drainage (since they have apparently not yet been done). The results then need to be incorporated in the next draft EIS so that it will be known how much use the river area can tolerate without adverse impacts.

Without such a system, it is difficult to imagine how BLM will be able to preserve the Fortymile River in its natural and free-flowing condition, as it is required to do. Although performance standards are useful, they can only go so far; specifically, although they can limit the impact of individual mines, they cannot ensure that the permitted levels of impacts under the standards do not add up to more adverse impacts than the Fortymile ecosystem can safely withstand. As the EIS points out, "turbidity has been very dependent on the amount of mining activity in a particular segment." EIS at 3-25. Only imposing absolute limits on the total amount of pollutants and other adverse impacts that will be allowed can adequately protect the river.

Another important advantage of evaluating these sorts of alternatives is that they require BLM to confront perhaps the most central cumulative impacts issue--namely, how much impact is appropriate for the Fortymile River system collectively (and its tributary streams individually), as measured in concrete terms like tons of sediment pollution or acres of unreclaimed land or linear feet of disrupted spawning habitat.

B. *Enforcement Alternatives*

The purpose of the Fortymile River EIS, at bottom, is to help BLM develop a management plan for regulating the impacts of placer mining within the drainage. An important part of such a management plan, of course, is enforcement. Nevertheless, there is no discussion of BLM's intended enforcement efforts in the draft. The next draft EIS should therefore evaluate several different enforcement alternatives, so that BLM is in a position to select a successful enforcement strategy. **58-11**

C. *Alternatives Analyzing Flood Risks*

An important cause or source of adverse impacts from mining is flooding. For instance, a mine may save up a season's worth of sediment in a settling pond, only to see all the sediments dumped back into the stream during a period of spring flood. Yet in this area, as in others, there is essentially no analysis. In the next EIS, therefore, BLM should identify the floodplain of Fortymile River (and each tributary with active mining claims) and then formulate and evaluate alternatives for protecting mining activities in these areas from flooding. And BLM should also evaluate what may be the best alternative of all -- requiring that all mining be kept out of the floodplain in the first place. **58-12**

D. *Bonding Alternatives*

One management option available to BLM to regulate mining impacts is bonding. 43 C.F.R. § 3809.1-9. Therefore, BLM should look at the pros and cons of using various possible bonding strategies (including a strategy of mandatory bonding) in the EIS. Nonetheless, there is no mention of this anywhere in the EIS. **58-13**

E. *Alternatives for Mitigating Abandoned Mines*

Abandoned mines continue to contribute to the adverse cumulative impacts within the Fortymile River drainage. For example, along the South Fork and Main Stem, "[t]he results of placer mining are extensive and noticeable." BLM, *River Management Plan - Fortymile River* at 14 (1983). Wade Creek has been "so impacted by mining that in many places there is no clue as to the original stream course." *Id.* at 18. Nevertheless, although these past actions cause contemporary impacts, the EIS proposes no alternatives for mitigating them. Upon revision, this deficiency should be rectified. **58-14**

Specifically, the revised EIS should evaluate as an alternative a plan that would require mining operators to reclaim the previously disturbed areas within the drainage as a form of "off-site mitigation." *See* 40 C.F.R. § 1508.24(e) (defining "mitigation" to include "compensating for the impact by replacing or providing substitute resources or environments"). **58-15**

F. *Alternatives for Regulating the "Notice" Mines*

BLM does not say whether the notice regulation, 43 C.F.R. § 3809.1-3, continues to have any force within the Fortymile River drainage after the court's ruling of November 6, 1987, in *Sierra Club v. Penfold.* This issues should be addressed in the next draft EIS.

58-16 More important, if the notice regulation is found to retain any viability in the drainage, BLM should evaluate as an alternative requiring individual permits (and individual NEPA review) for all such mines. As we have argued in *Sierra Club v. Penfold*, these mines are one of the principal causes of the adverse impacts on the drainage. They therefore warrant individual review.

Moreover, if there are any such mines on the drainage, their impacts should be evaluated in site-specific detail -- at least if BLM's decision is not to require further NEPA review. In that instance, the decision to reject the alternative of individual review would be a "critical decision" that represents an "irreversible and irretrievable commitment of resources" to the mines. *California v. Block*, 690 F.2d 753, 761 (9th Cir. 1982).

IV. *The EIS Unduly Minimizes Mining Impacts*

A. *The EIS Does Not Adequately Look at Past Impacts*

The EIS is misleading because it does not present any water quality data from before 1987. EIS at 3-26, 27. The only references to mining from prior years mention just that there have been improvements in meeting the water quality standards (and that they have not always been met). No mining prior to 1985 is mentioned except in an historical context. EIS at 3-16, 25. However, any look at cumulative impacts must consider the past impacts as well as present and future ones. 40 C.F.R. § 1508.7.

58-17 Data from just a few years back suggest that even a slight increase over 1987 levels in the number of mines operating with variances for turbidity levels (as would be allowed in the proposed action) could quickly lead to deteriorating water quality. For example, in a 1983 report sections of the Fortymile were noted to have water that was "often turbid enough to reduce visibility to less than 2 inches." BLM, *River Management Plan - Fortymile River*, at 14 (1983). In 1984 and 1985, even after improvements in water quality from previous years partly due to decreased mining, several sections of the Fortymile, Wade Creek, Walker Fork, and probably the South Fork below Walker Fork, did not meet the turbidity standards due to impacts from placer mining operations. Alaska Department of Environmental Conservation (ADEC), *1984 Fortymile Mining District Annual Report*, at 1 (Jan. 1985); *1985 Fortymile Mining District Annual Report* at 1 (Dec. 1985). In 1985, all 14 samples taken *500 feet downstream* from the mines of seven different operators were over the limit for turbidity. (Values ranged from 12 to 9000 NTU.) Alaska Department of Fish and Game, *Summary of Water Quality and Aquatic Habitat Data* at 125 (1987).

Despite this lack of consideration of past data in the EIS, it nevertheless concludes that "[i]f water quality standards are enforced as they have been recently, deterioration of water quality due to mining activity would not be noticeable beyond that which is due to the sediments contributed from natural (background) sources." EIS at 4-14. It seems clear that if the EIS had included data from just a few years ago when mining levels were higher (there were 40-50 placer mines in 1984, 35-40 in 1985, 40-50 in 1986, ADEC, *1984, 1985, & 1986 Fortymile Mining District Annual Report* at 1 (1985, 1985, 1987), and only 30 placer mines in 1987, EIS at 3-18), a very different conclusion might have been reached. The next draft EIS must include earlier data and take it into account when reaching conclusions about future potential impacts. **58-17 cont'd**

B. *The EIS Makes Unfounded Conclusions*

The EIS repeatedly concludes that mining will have minimal impact on different aspects of the river drainage after outlining unknown parameters. For example, in the following paragraph there are two admitted unknowns and one acknowledged negative effect and yet the final sentence definitely concludes that there would be no negative impact:

> Physical alteration of streams and increases in suspended sediment from mines in the basin would result in *unknown cumulative effects* on the aquatic resources. Streams that are blocked to fish passage would also be unavailable as habitat to some fish populations in the affected area. The overall cumulative effect of total suspended sediment in the Fortymile River *cannot be determined.* Fishery resources would remain similar to those present in 1987. **58-18**

EIS at 2-17 (emphasis added). It is difficult to have confidence in such shaky conclusions.

V. *The EIS Prevents Informed Decisionmaking*

An equally fundamental problem with the EIS is that it does not provide a basis for intelligent decisionmaking or informed public comment. This is contrary to NEPA's basic objectives. *Oregon Natural Resources Council v. Marsh*, 820 F.2d 1051, 1054 (9th Cir. 1987).

For example, the EIS repeatedly blurs the distinctions between the alternatives with too superficial an analysis. A stellar example of this superficiality concerns the reclamation of aquatic habitat. One of the central differences between the EIS's preferred alternative and alternative C, the environmentally preferable alternative, is their different treatment of aquatic-habitat rehabilitation. Specifically, unlike the preferred alternative, alternative C requires a mining operator to reestablish natural features, such as riffles and pools, in any reach of stream disrupted. Therefore, it is crucial that the EIS tell the decisionmaker and the public what the benefits and disadvantages of such additional reclamation would be. Yet this is not done. **58-19**

58-19 cont'd Instead, all that the EIS says is that under alternative C, "replacement of habitat could minimize the long-term impacts to fish habitat." EIS at 4-48. This is so obvious as to be completely unhelpful. Plainly, it falls far short of providing a useful level of detail. What the EIS should do is address relevant questions like what the biological productivity of reclaimed stream reaches would be under the two alternatives, as measured, say, in diversity and quantity of aquatic life, and how long stream rehabilitation would take under each alternative.

58-20 When discussing the impact on water quality under the proposed action, the EIS concludes that "deterioration of water quality due to mining activity would not be noticeable beyond that which is due to the sediments contributed from natural (background) sources." EIS at 4-14. Then, even though there are quite different water quality standards to be met under alternative C, the conclusion there is that "[t]he magnitude of effects ... is expected to be minimal." EIS at 4-16. Is "minimal" better than, worse than, or equal to "not noticeable"? The EIS needs to clarify what the expected impacts will be under each alternative.

In other words, the problem with the EIS is that it does not adhere to the requirement that an EIS enable a reviewer to "evaluate the comparative merits " of different alternatives. 43 C.F.R. § 1502.14(b). In this case, no comparative evaluation is possible because the level of analysis is far too general. The next draft EIS needs to make the differences between the alternatives much clearer.

VI. *Suction Dredging and Its Impacts Are Not Adequately Considered*

58-21 Although suction dredging is "commonly used in this drainage," EIS at 2-5, and "has become a major activity in the basin," EIS at 3-17, the impacts of suction dredging in the area "have not yet been evaluated." EIS at 4-12. Since there were 35-40 suction dredgers operating in 1987, EIS at 3-18, the impacts from these operations need to be included in the next EIS.

A. *BLM Has Authority to Regulate Suction Dredging*

58-22 Since most suction dredging activity is on the navigable streambed and is therefore under State management, BLM claims that it can only regulate the camping of suction dredgers which usually takes place on BLM-managed lands. EIS at 3-17. However, this is not correct. BLM has the authority to regulate the suction dredgers through the camping permits since any conditions it imposes on dredging would "protect and enhance" the Fortymile Wild and Scenic River by limiting the impacts of dredging on the river. These conditions would, therefore, be authorized by 16 U.S.C. § 1281. Moreover, 16 U.S.C. § 1283(a) provides that in managing wild and scenic rivers, the Secretary "shall take ... action" "respecting management policies" "as may be necessary to protect such rivers." Imposing suction-dredging restrictions in a camping permit is an "action"; it is a management policy"; and it "protects" the Fortymile. Therefore it is authorized by § 1283(a) as well as § 1281.

BLM also has the authority to regulate suction dredging operations directly. There is a "well-established" principle that "the United States [has] power to

regulate conduct on non-federal land when reasonably necessary to protect adjacent federal property or navigable waters." *United States v. Lindsey*, 595 F.2d 5, 6 (9th Cir. 1979). The Ninth Circuit has held that the Forest Service could regulate mining activity on state claims that were adjacent to Forest Service lands because control of matters such as "sanitation facilities, garbage treatment, tree cutting and fire prevention" on the state mining claims were "reasonably necessary to protect adjacent federal property." *United States v. Arbo*, 691 F.2d 863, 865 (9th Cir. 1982). Likewise, a long series of Eighth Circuit decisions have upheld federal authority to regulate activities on state or private land that affect federal lands. *See Free Enterprise Canoe Renters Association v. Watt*, 711 F.2d 852, 855-56 (8th Cir. 1983) ("It is undisputed that the U.S. ... [may] regulate ... the business activities of the [plaintiffs] ... as they affect the [national scenic river], even though the [plaintiffs] themselves may never enter federal property, but strictly keep to state or county roads"); *Minnesota v. Block*, 660 F.2d, 1240, 1249 (8th Cir. 1981) (Congress' power ... extend[s] to regulation of conduct ... off the public land that would threaten the designated purpose of federal lands"), *cert. denied*, 455 U.S. 1007 (1982); *United States v. Brown*, 5552 F.2d 817, 822 (8th Cir.) (Park Service may prohibit hunting on state waters within a national park because "the congressional power over federal lands ... include[s] the authority to regulate activities on non-federal public waters in order to protect wildlife and visitors on the lands"), *cert. denied*, 431 U.S. 944 (1977). These situations are analogous to BLM regulating suction dredging and indicate that BLM has the necessary authority to regulate that kind of mining. **58-22 cont'd**

Finally, BLM has specific authority under the National Wild and Scenic Rivers Act to enter into management agreements with the state. 16 U.S.C. § 1281(e). Suction dredging could also be regulated in this manner.

B. *BLM Must Revise its Evaluation of Suction Dredging Impacts and Analyze a Range of Alternatives*

Since BLM has authority to regulate suction dredging, the impacts of suction dredging need to be considered in the next draft EIS. Specifically, BLM must analyze issues such as the following:

1) The number of dredges likely to operate.
2) The location of the dredges.
3) The extent to which the dredges discourage recreational use.
4) The noise pollution caused by the dredges.
5) The impacts of the dredges on the river bottom.
6) The impacts of the dredges on navigation.
7) The contribution of the dredges to water pollution and solid-waste problems.
8) The impacts of the dredges on peregrine falcons.

In addition, BLM must consider a range of alternatives to reduce the adverse impacts of suction dredging. The alternatives should include alternatives that impose limits on the number of dredges that can operate at one time. This is

58-22 cont'd ecessary because without restrictions on numbers, dredges could dominate portions of the river.

The alternatives should also consider setting "performance standards" for the suction dredges, just as BLM proposes to do for other mines. Such standards should address issues such as noise levels, reclamation requirements, and permissible dredge sizes (including intake diameters).

VI. *The Unique Aspects of Fortymile River and Its Mining Are Not Considered*

A. *Hydraulic Mining*

58-23 In 1987, at least one mine used giants to hydraulically strip the overburden and move gravels. EIS at 3-18. This technique is "particularly efficient when the overburden thickness is considerable. This method requires a very large water treatment system due to the huge quantities of water used in washing away the overburden." EIS at 2-3. In some localities, silt beds "may have a thickness of 100 feet or more" and these deposits above the gold-bearing gravels "present one of the greater difficulties of placer mining in interior Alaska." EIS at 3-8.

The potential environmental concerns of flushing away such large amounts of overburden are great enough to warrant detailed analysis in the EIS. The special environmental problems posed by hydraulic mining should be identified and evaluated. In addition, the EIS should formulate "performance standards" for hydraulic mining, just as it proposes to do for other mines.

B. *Fossils*

58-24 Fossils have been found in several areas of the Fortymile drainage. EIS at 3-5. A mining site on Lost Chicken Creek, a tributary to the Fortymile, is "exceptionally rich" in late Pleistocene fossils and "is of critical value to Alaskan paleontology and archeology...." Attachment to letter from K. Leroy Cook, Acting Fortymile Area Manager, to G.A. Hanks & Sons (April 24, 1981).

The EIS simply states that "[i]n the event of future hydraulic operations there is good potential for additional Pleistocene faunal recovery." EIS at 3-51. The next draft EIS should consider different ways of insuring that these irreplaceable fossils will be protected to the greatest extent possible.

VII. *Specific Comments*

A. *Inaccurate Methods Are Used for Projecting Numbers of Operating Mines*

58-25 There are several problems with the way the EIS forecasts the future number of mines. First of all, while the EIS uses data from an EPA report on the percentage of income reduction to be expected under different technology options, the EIS does not use the same report's figures on the expected number of mine

closures. EIS at A-4. While the EIS says, as does the report, that a reduction in income would range between 13% and 27%, the EIS then assumes that the same percentage of mines would not be able to afford the added cost of compliance. The EIS makes this assumption with no explanation or support. EIS at A-4. However, the EPA report, in the same tables cited in the EIS, forecasts that no mines would close under any option except the one requiring the most expensive technology, and in that case only one mine, out of 172 small Alaska mines, would be expected to close. That projection is a closure rate of only 0.58%. No medium-sized mines would be expected to close. EPA *Economic Impact Analysis of Effluent Limitations* at VIII-21, 22 (1987). The next EIS needs to adopt EPA's closure figures or explain why BLM deviated from EPA's analysis after relying on EPA's cost estimates. 58-25 cont'd

There is another problem with the EIS forecasting. Even if a 10% decrease in income causes the number of mines to drop by 10%, a 10% increase in gold prices should cause a far greater increase in the number of operating mines, contrary to the EIS's prediction. This should happen because, since the EPA report appears to be referring to *net* income, a 10% increase in gold prices will cause profits (net income) to go up by substantially more than 10%. For example, if gold is selling at $450 per ounce and the profit is $45 per ounce, a 10% increase in gold prices to $495 per ounce would increase profit to $90 per ounce (or 100%), which under BLM's reasoning should double the number of mines on the drainage. 58-26

A related criticism concerns the manner in which the EIS displays the impacts of the alternatives. Presently, these impacts now vary according to the number of estimated mines as well as the degree of potential impacts for each mine. This makes it difficult to compare the alternatives. A change that appears to be an altered impact because of the differences in the alternatives may simply be due to the different number of expected mines. Since the number of estimated mines cannot be completely accurate, the differing impacts under each alternative should be expressed as a per mine average as well as continuing to give the estimated total values.

B. *Worst-Case Analysis*

Another problem with the numbers of projected mines is that the worst-case scenario does not seem bad enough. Since there are 864 active federal claims and 823 other claims in the river drainage, EIS at A-5, the figure of 170 active mines per year does not seem extreme enough to be the worst-case scenario. 58-27

Also, the discussion and analysis in the worst-case analysis in the EIS needs to be expanded beyond a one page table. *See* EIS at 2-25.

C. *Mitigation*

The mitigation measures for placer mining are discussed in one page of text and 2 1/2 pages of charts. EIS at 4-72 to 4-76. The text discusses no specific mitigation measures while the chart briefly lists them as either "mitigation under the alternatives" or "further mitigation not covered under the alternatives." This presentation poses a couple of problems. 58-28

58-28 cont'd First, the discussion is potentially misleading since most of the mitigations are not required under the Proposed Action.

Second, the brief listing does not meet the legal requirements since an EIS "must analyze the mitigation measures in detail and explain the effectiveness of the measures." *Oregon Natural Resources Council v. Marsh*, 820 F.2d 1051, 1055 (9th Cir. 1987). Here there is no analysis.

D. *Extent of Future Impacts*

58-29 Under all of the alternatives, it is assumed that mining will continue for ten years. Yet although the potential cumulative impacts are calculated for a ten-year period, there is no explanation of why this length of time was chosen.

It seems likely that mining will continue for more than ten years. For instance, the EIS states that "280 acres will be reclaimed within 10 years, with the remainder reclaimed *at the end of the mine life*," which is presumably some later date. EIS at 4-3 (emphasis added). If mining in this river drainage is likely to continue for more than ten years (and there is no indication in the EIS that it will not), then the impacts of that mining are "reasonably foreseeable" and should be included in the discussion. 40 C.F.R. § 1508.7.

E. *The Cost Data Are Misleading*

58-30 The main advantage to the proposed action is that its costs to mining operators are said to be cheaper. But this advantage does not survive scrutiny.

The cost data for the proposed action are based on a simple settling system with an EPA variance for turbidity discharge. EIS at 2-15. Simple settling, however, is now illegal under the new EPA effluent guidelines, which means that it cannot legitimately be used as the basis for BLM's cost estimate. When the costs of the total recycle systems required by the effluent limitations are computed, they turn out to be more than five times the costs of simple settling ($28,700 versus $5,200). EPA, *Economic Impact Analysis of Effluent Limitations for the Placer Gold Mining Industry* at VI-8 (1987). This increase in costs eliminates most of the supposed advantages of the preferred alternative.

Also, a number of mines are already operating under zero discharge or other systems that would enable them to meet the water quality standards of the alternatives with either no or smaller increases in cost. Therefore, this factor should be taken into consideration in the EIS as well.

F. *Impacts on Peregrine Falcons*

58-31 The description of the proposed action states that protective measures would be required for any mining activity within one mile of a peregrine falcon nest. It then states that "[n]o anticipated activities are within one mile of any known nest areas." EIS at S-4. However, in a later section, the EIS describes the protective

measures recommended within two or fifteen miles of a nest site as well as within one mile. EIS at 4-41, 43. The EIS does not make clear whether all the protective measures would be required or only those within one mile of a peregrine nest site. It says only that protective measures "may be employed by BLM, if necessary". EIS at 4-43. This issue should be clarified in the next draft EIS. 58-31 cont'd

G. *The Erosion Figures are Suspect*

The figures used in the EIS to estimate erosion from mining sites are based upon EPA estimates developed in the continental United States. EIS at A-18. These are suspect, however, because Alaska conditions are quite different; to take but one example, Alaska mines rip up permafrost, which when disturbed is far more erosion-prone than other soils. The EIS, therefore, must either adapt its figures to Alaska conditions or explain why the continental figures can be considered reliable in Alaska. 58-32

H. *BLM Has Water Quality Responsibilities*

Another error in the EIS is its assertion that BLM has no authority to regulate pollution from mining that is effecting Fortymile River or its tributaries. *See* EIS at 2-13. This is not so.

To the contrary, there is abundant statutory and regulatory authority justifying BLM action to protect Fortymile River from water pollution. *See, e.g.*, 16 U.S.C. § 1283(a) ("the Secretary ... shall take such action ... as may be necessary to protect [wild and scenic] rivers"); 16 U.S.C. § 1701(a)(8) (BLM shall ensure that "the public lands [are] managed in a manner that protects the quality of ... water resources"); 43 C.F.R. § 3809.0-5(k) ("unnecessary or undue degradation" includes "failure to comply with applicable environmental statutes and regulations"). Indeed, in passing ANILCA, Congress specifically directed BLM to protect national wild and scenic rivers from pollution from mining: 58-33

> We expect the Secretary to use his authority under the Federal Land Policy Management Act to manage publicly owned watersheds adjacent to the designated river corridors in such a manner as to not jeopardize the wild and scenic rivers. ... *Such management would involve careful control over mining ... that could result in pollution and siltation of tributaries to designated wild and scenic rivers.*

126 Cong. Rec. H10543 (daily ed. Nov. 12, 1980) (excerpt of "detailed discussion" submitted Rep. Udall).

This point has important practical ramifications. It means that it is unlawful for BLM to leave the issue of mixing zones or "variances" for mining discharges entirely to EPA and the Alaska Department of Environmental Conservation -- as BLM proposes to do in the proposed action. To the contrary, because BLM is charged with protecting Fortymile River, BLM must ensure that any mixing zones or variances proposed by other agencies are stringent enough to protect the river. And of course, this in turn means that the EIS needs to examine what kind of 58-34

58-34 cont'd mixing zones or variances, if any, would be appropriate -- which is yet another shortcoming in the present draft.

I. *Comments on Other EISs*

Though many of our comments on the Beaver Creek and Birch Creek EISs have already been repeated here, since the Fortymile River EIS is so similar to the Beaver Creek and Birch Creek EISs, our comments on those two EISs are hereby incorporated by reference into these comments. Similarly, these comments on the Fortymile River EIS are hereby incorporated into our comments on both of the previous EISs.

VIII. *A Supplemental Draft Should Be Circulated*

Because of the many serious deficiencies in the current draft EIS that need correction, BLM should circulate a new draft EIS for public comment. *See* 40 C.F.R. § 1502.9(c).

Very truly yours,

Philip S. Barnett
Philip S. Barnett

Lee Ann Swarm
Lee Ann Swarm, Law Clerk

cc: Emily Barnett, Sierra Club
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Denby Lloyd, North Pacific Fisheries Management Council
Eric Smith, Rural Cap

58-1 The ADEC enforces water quality performance standards and the EPA is responsible for the compliance with effluent guidelines by all operations within the Fortymile River watershed. If the standards are not met, it is incumbent upon these agencies to serve the operator with a notice of non-compliance. The final EIS includes heightened reclamation standards which should lessen impacts from non-point sources of pollution. This requirement, along with a vigorous water quality enforcement program, will further reduce the impacts to water quality in the Fortymile watershed.

58-2 The Proposed Action would not allow mines to violate any current or future performance standards set by the EPA.

58-3 See response 58-1, and revisions to Section 4.4.

58-4 See Proposed Action, Section 2.5, and applicable portions of Chapter Four.

58-5 See revisions to Sections 2.3.2 and 4.7.

58-6 See revised text in Section 4.4, and addition of cumulative impacts discussion for each resource in Chapter Four, under the heading "Special Considerations."

58-7 Such information would require a major research effort, beginning with several years of data collection, and several more of modeling and analysis. This analysis would result in a more quantitative comparison of alternatives, but would not change the relative trends of impacts between alternatives. BLM chooses rather to focus effort and finances on the development of effective reclamation techniques and monitoring, in conjunction with cooperation with agencies responsible for development and enforcement of water quality and effluent limitation standards and guidelines.

58-8 The cumulative impacts of placer mining on Mosquito Fork above the Taylor Highway bridge have been included in the final EIS.

58-9 See revision to Section 2.4.

58-10 See Section 2.4 for the addition of an alternative which considered thresholds, but was not analyzed in this EIS.

58-11 See Section 2.3.1. Additional details will be provided in the Record of Decision.

58-12 Regulations for process water treatment systems currently require that such systems be sized sufficiently to handle predicted flood flows. Operators with valid claims have a right to operate while in compliance with existing legislation and regulations. As placer deposits occur in flood plains, any requirement eliminating mining from flood plains would abrogate those rights.

58-13 See Section 2.3.1. Also see Section 560 of the Act of October 30, 1986, Public Law No. 99-591, which sets forth Congressional policy that bonding is to be discretionary.

58-14 The 43 CFR 3809 regulations require reclamation for disturbance which has occurred on federal claims after January 1, 1981. At the end of the 1988 mining season, approximately 140 acres of post 1980 disturbance was reclaimed. However, most of this acreage is on active operations, with an estimated 27 acres of unreclaimed liability. This is a very small proportion of the total disturbance projected under any of the alternatives. As old tailings are remined, these areas will be reclaimed as part of the mining operation. Some of the historic mining areas are considered an attraction for recreationists in the area (Section 3.10).

58-15 The 43 CFR 3809 regulations require operators to reclaim areas which they disturbed after January 1, 1981. BLM has no authority to waive reclamation on a site which the operator has disturbed since that date, and to require that operator to reclaim some other area instead.

58-16 The EIS does not differentiate between plan and notice level operations because all operations must meet the performance standards.

58-17 Limited historic data preclude a strict quantification of past impacts. Evidence of past practices and their effects are mentioned throughout the text (e.g., elimination of fish habitat on Chicken Creek, damming and channelization of streams, etc.). Earlier data that would quantify these effects is not available. Nor do past turbidity measurements quantify past impacts. The EIS conclusion recognizes the difficulty in separating point and non-point sources of sedimentation and the extent of historic disturbance in the watershed.

58-18 See revised text.

58-19 See Section 4.7.

58-20 "Minimal" is equal to "not noticeable." Historic disturbance and non-point source pollution will impact all alternatives, as discussed in the revised Chapter Four.

58-21 So noted, additional narrative is present throughout the document. Also see response 58-22.

58-22 The question of federal regulation of non- federal land raises difficult and complex issues. As pointed out in the Sierra Club comments, courts have recognized the general proposition that Congress has the constitutional power to effect non-federal lands when reasonable and necessary. Recitation of such a broad principle of law does little, however, to answer the real question in regard to the Fortymile situation. The real question is whether BLM can presently regulate suction dredging on the beds of navigable waterbodies within the Fortymile National Wild and Scenic River corridor.

In this regard, it has been BLM's continuous position that it does not presently have sufficient regulatory control over State-owned land within the Fortymile Wild and Scenic River corridor. The very statute creating the Fortymile unit defined the boundary of that unit to "not include any land owned by the State or a political subdivision of the State...." (Emphasis added.) Sec. 606(a) of the Alaska National Interest Lands Conservation Act, 16 USC 1285b. On its face, the statute thus fails

to reach out and attempt to effect or bring under prescription any State land. This is a substantial distinguishing point between the Fortymile River and the situations in the cases cited by the Sierra Club in its comments, since those cases generally deal with specific prohibitions within the outer boundaries of a described area. Here, State land have been expressly left out of the description of the boundaries of the Fortymile Wild and Scenic River corridor. Consequently, the management requirements of the Wild and Scenic River Act are not by explicit statutory mandate applied to State-owned lands in the Fortymile corridor. Nor has BLM attempted to regulate the conduct of suction dredging on non- federal land by promulgating specific regulations intended to affect or control such activity.

This conclusion was articulated years ago by the Alaska Land Use Council. In a report issued in November 1982 entitled "A Synopsis for Guiding Management of Wild, Scenic and Recreational River Areas in Alaska," the Alaska Land Use Council stated:

> Management of Non-federal Lands: Non-federal lands, including the bed of navigable streams, are excluded from the authorized boundary of wild, scenic, or recreational river areas (Section 606(a) of P.L. 96-487).
>
> The management of these lands is therefore not directly subject to the provisions of the Wild and Scenic Rivers Act.
>
> For example, subject to State of Alaska rules and regulations, state owned lands may be opened to filing of mineral claims and to oil and gas leasing and development. The State of Alaska retains its rights, including the right of access to the beds of navigable rivers (refer to Section 13(f) of P.L. 90-542), title to which is passed to the State under the Submerged Lands Act.

Similarly, the BLM articulated in its Fortymile River Management Plan, that:

> Those portions of the Fortymile National Wild, Scenic, and Recreation River which in their natural ordinary condition were used or were capable of being used as "highways of commerce" as of Alaska Statehood in 1959 are considered navigable for title purposes. For those portions determined to be navigable, the State retains ownership of the riverbed between ordinary high- water marks and lands are not included within the boundaries of the river corridor.
>
> A final determination of navigability has been made by the BLM, and the findings are that, as of Statehood, the Fortymile River was susceptible to navigability from its mouth upstream to the confluence of the north and south forks ... the lands beneath these waters are excluded from the boundaries of the river corridor.

Moreover, several recognizable factors mitigate against BLM attempting to assert control over suction dredging on non-federal waterways in Alaska at this time. One, the State of Alaska has principal jurisdiction over such activities by virtue of its land ownership. There is no reason to think the State cannot or will not carry out their responsibilities in a satisfactory manner. Moreover, BLM has been working with and coordinating with the State in an effort to best address

suction dredging concerns within the Fortymile Wild and Scenic River corridor. In specific, the suction dredge management conditions BLM recommends are generally those required by the State through its permitting process. In addition, assertion of federal supremacy and regulations when the State can adequately perform the required duties, would seem to be inconsistent with Executive Order 12612, entitled "Federalism," signed by President Reagan on October 26, 1987.

Similarly, BLM has not been designated as the federal agency with primary responsibility for regulating suction dredging on the beds of navigable waterways. Rather, the Corps of Engineers exercises federal responsibility for controlled activities within navigable waterways and the Environmental Protection Agency has federal responsibility for water quality requirements.

While not necessarily disagreeing with the broad legal principles recited in the Sierra Club comments, BLM was nevertheless correct in concluding in the draft EIS that placer mining claims within navigable portions of the Fortymile River "are staked and mined under State of Alaska mining laws and BLM has no clear authority or jurisdiction to regulate such activities.

58-23 The performance standards for a large operation, such as a hydraulic operation, would be the same as for other mines; however, special mitigating measures would be applied if a review of the operation indicated that such actions were necessary.

58-24 The area of Lost Chicken Creek where Pleistocene fossils have been found has undergone study and collection by paleontologists for several years. The particular claims addressed in the comments are now patented. The collection of fossils and paleontological specimens are covered under the Archaeological Resources Protection Act of 1979 and BLM's various policies and agreements for management of paleontological specimens. There is no need to address fossil protection at the EIS level in the event of hydraulic operations for two reasons: 1) with the environmental protection stipulations being imposed, it is highly unlikely that there will be much, if any, future hydraulic activity in the drainage and 2) such an operation would require an Environmental Assessment, and protection of paleontological resources would be addressed on a case-by-case basis with site-specific stipulations, due to the importance of potential recovery with a hydraulic operation.

58-25 The EIS did not use the EPA's estimated number of mine closures because the number appeared to be unrealistic, due to the projected significant cost increases for water treatment compliance. On August 11, 1988, the Department of the Interior (DOI) commented on EPA's effluent limitation guidelines and recalculated the economic impacts to the placer mining industry. DOI's recalculation indicated that more than 75% of all very small and small placer mines would close under the new guidelines, a marked contrast to the 13 miners that EPA projected would close. Since the EPA and DOI projections for mine closures vary so greatly, the draft EIS estimates of 13% and 27% will be used in the final EIS.

58-26 The one-to-one relationship between the number of mines and the price of gold was not based on net income or profit. The number of mines analyzed under the other alternatives is a function of cost of compliance to meet standards. However, since the price of gold is a constant

in this analysis, the different economic impacts among the alternatives are a function of the number of mines and the anticipated cost of of compliance with each alternative.

58-27 Although there are 1,687 claims in the watershed, a mining operation generally incorporates a block of claims over a period of several years. BLM estimated that a block of 15 to 20 claims would be used per mine. Expanded discussion of the Worst-Case Analysis is in Appendix B-2.

58-28 See revisions in Section 4.13. As indicated, actual mitigation measures will be prescribed on a site-specific basis, as part of the EA for individual mining operations.

58-29 BLM believes that the reasonably foreseeable future of mining impacts is discussed in Chapter Four for each resource evaluated, and for each alternative.

58-30 The water treatment cost data for the final EIS have been revised.

58-31 Summary on peregrine falcons has been revised.

58-32 See additions to Section 4.4.

58-33 Mining operators are required to meet the water quality standards established be EPA and ADEC.

58-34 Text has been clarified. BLM's intention is to comply with water quality standards via permitting from other agencies. The State of Alaska has the responsibility for determining when or if a mixing zone variance will be allowed. See 18 AAC 70.032 for details of how one can apply for a mixing zone variance from the State.


by Wilbur Mills

Sierra Club
Alaska Field Office
241 E. Fifth Avenue, Suite 205, Anchorage, Alaska 99501, (907) 276-4048

August 12, 1988

Mr. Richard Dworsky
Bureau of Land Management
701 C Street, Box 13
Anchorage, Alaska 99513

Re: Comments on Fortymile and Minto Flats Draft EIS's

Thank you for the opportunity to comment on the Fortymile River and Minto Flats. We recently submitted written comments concerning the Draft EIS for Birch Creek. Due to the similarity of all four of your draft EIS's, the following comments are basically the same as and will parallel our Birch Creek comments. Please refer to those for more detail.

We appreciate BLM's decision to do a full EIS for the Fortymile and Minto Flats. Unfortunately, as was the case with Birch and Beaver Creeks, the Fortymile and Minto Flats EIS's have many serious shortcomings which render the documents inadequate. We urge BLM to make the necessary changes and issue revised Drafts for public review.

1. <u>Performance Standards</u> A major problem lies in BLM's choice to limit their range of alternatives to a spectrum of "performance standards" concerning water quality and reclamation standards. While these certainly should be included, performance standards should not be the determining factor in delineating the alternatives--performance standards are by no means the whole solution.

Specifically, BLM should consider alternatives that are directed by the sensitivity and capacity of the resource in question and
59-1 which include resource-based limits. For example, BLM should determine maximum pollution levels for each drainage and manage the mining operations so as to ensure that these ceilings are not exceeded. If and when these ceilings are reached, BLM would know to limit new mining operations or require existing mines to implement offsetting reductions. Such an approach would give BLM clear management guidelines that would allow BLM to monitor and control the cumulative effect of mining on the whole drainages.

Without such a system it is difficult to see how BLM will be able to preserve the Fortymile River in its natural and free-flowing condition, as it is required to do. Performance standards are useful, but they cannot ensure that the permitted levels of impacts under the standards do not add up to more adverse impacts than the ecosystem can safely withstand. Absolute limits on the total amount of pollutants and other adverse impacts must be imposed.

2. <u>BLM has additional statutory mandates.</u>

BLM's management responsibilities exceed ensuring simple compliance with state and federal regulations. BLM has the unique responsibility of managing and protecting the Fortymile River as a National Wild and Scenic River. As such, BLM has an affirmative duty to ensure that the waters of a component of a Wild and Scenic river are not degraded. BLM must determine if the state regulations provide an adequate amount of protection to prevent degradation, and, if not, implement more restrictive measures as needed.

3. <u>Underlying assumptions used for mine projections are flawed.</u>

The major distinction used to determine the differences in environmental impacts of each alternative is the variation in the projected number of operating mines. Not only does this omit many other important considerations, but the basic assumptions used to set these levels are flawed.

First, it must be made clear that a projection of the cost of gold 10 years from now is pure speculation. Second, the assumption that there is a <u>one-to-one</u> ratio between the increase in the price of gold and the increase in the number of mines operating, is completely unsubstantiated. This method of projecting the number of mines has no basis in any economic theory. Certainly BLM would agree that there are many other variables that influence whether or not a mine is operated.

59-2

This same faulty logic was used to determine the reduction in the number of mines operating under different water treatment systems. Using EPA data, BLM calculated the predicted decrease in income (due to the increased operating costs) and then reduced the number of mines that would operate by that same percentage. This assumption is totally arbitrary. We understand the possible usefulness of setting some levels for analyzing purposes, but it should be made clear that these are arbitrary estimates rather than numbers that are actually founded in a rational economic theory, as the EIS seems to convey.

Given the way the alternatives are structured, these numbers have taken on enormous importance in the evaluation of the alternatives. In fact, the whole analysis of the environmental impacts under the various alternatives proceeds from the primary

59-2 cont'd assumptions about the difference in the number of mines operating, determined with this arbitrary assumption. It is irresponsible to mislead the reader into assuming that these numbers are anything more than pure speculation used for the purposes of analysis. The evaluation of the alternatives should not be based on an arbitrary economic scenario.

4. Estimated costs are misleading.

59-3 One of the main arguments used in support of the Proposed Actions in both EIS's is the assertion that it will cost much less than the other alternatives. The EIS states that the water quality implementation costs associated with the Proposed Action would total $5,200 per mine. However, the $5,200 figure represents only what it would cost to operate a simple settling system. This type of system is not acceptable under the new EPA effluent guidelines requiring zero discharge. EPA data indicates that an operation with zero discharge and some seepage would cost $28,700 -- more than a five-fold increase over the cost estimate used in the EIS's. This is a much more realistic figure and should be used in order to present meaningful comparisons. The existing misrepresentation undermines the validity of the entire EIS.

Differences between the alternatives are downplayed.

59-4 The discussion in the EIS's of the environmental consequences of each alternative does not adequately distinguish between the alternatives. For example, for the Fortymile, the description of water quality impacts for Alternative C is essentially identical to that of the proposed action, even though Alt. C includes considerably higher water quality and reclamation standards. (EIS, S-3 & S-9) More detail must be provided on the benefits that can be obtained from implementing the higher standards of Alt. C. How, for example, would the stricter reclamation standards, including stream reconfiguration, lessen the negative impacts on fish habitat? How much faster would regrowth occur when the fines are spread over the tailings? What are the benefits to water quality of the 0 ml/l and 0 NTU? Evaluation of the environmental consequences must include this kind of information.

59-5 The EIS's only distinguish the impacts of the different alternatives due to the projected decrease in the number of mines operating and the associated decrease in disturbed acreage and pollution. As pointed out above, both the cost figures and the projection numbers used to determine these acreages and disturbance quantities are ill-founded. The evaluation of impacts of the alternatives is based too narrowly on the projection of operating mines, to the exclusion of other vital issues.

6. BLM's analysis should extend beyond 10 years.

The EIS's fail to consider adequately the long-term impacts of mining in the Fortymile and Minto Flats systems. BLM is responsible for evaluating all "reasonably foreseeable" future impacts. There is no reason to expect mining activity to stop 10 years from now. The EIS should include an analysis of the projected impacts with the assumption that mining activity will continue for the next 30-50 years. 59-6

7. The EIS lacks critical data.

The EIS is missing so much important information that it fails to provide a basis for informed public comment. BLM was mandated to evaluate the "cumulative impacts of multiple mining operations on the environment" yet in many instances the EIS simply states that the data is "unknown" or "unavailable". This was precisely the point of the EIS -- to obtain the necessary information to evaluate the cumulative impacts. It is not acceptable for BLM to justify omissions by claiming that the data is unknown. The necessary research should be done to obtain this information.

A glaring example of this can be found in the Fortymile EIS where it states that "The overall cumulative adverse effect of total suspended sediment and turbidity increases in the Fortymile drainage cannot be determined." [emphasis added] (EIS, S-5) This is exactly what needs to be determined and considered. Many further examples can be found in the EIS's. This means performing the necessary field research projects when existing data is not available. As is, the EIS's contain large data gaps. It is unacceptable to make long-range management decisions without this information.

8. The EIS contradicts itself.

In many instances the EIS's present conflicting information. This not only leaves the reader confused, but jeopardizes the credibility of the entire document. These discrepancies need to be resolved before a concerned citizen can be expected to make an informed judgement.

9. Subsistence evaluation is inadequate.

The evaluation of subsistence impacts must extend beyond 5-10 years. It is unrealistic to judge the impacts of the various alternatives by how much change to the subsistence resources will occur in the next 10 years. Such a limited evaluation is unacceptable and should be changed. 59-7

10. Enforcement

59-8 The EIS's fail to include any plan concerning BLM's intended enforcement efforts. This is an essential part of any management strategy that is expected to be reasonably effective. BLM must make a strong commitment to an enforcement program. A revised draft EIS should include a detailed plan for enforcement.

11. Flood Events

59-9 The EIS's should include an evaluation of how best to prevent and mitigate the impacts of flood events. It is all too frequent that a season's worth of carefully settled fines get washed downstream in a spring flood. Such events contribute significantly to the adverse effects of mining and should be fully considered in the EIS.

12. Suction Dredging on the Fortymile

59-10 The EIS fails to consider the impacts of suction dredging on the Fortymile. The EIS simply claims that "Impacts from the large number of suction dredge operators in the basin have not yet been evaluated." (EIS, 4-12) Given that 35-40 suction dredges were operated in 1987 (EIS, 3-18) the impacts of suction dredges must be included. How many dredges are predicted? How do they effect recreational use? What are their impacts on water quality? Fish Habitat? Peregrine Falcons?

Furthermore, under the Wild and Scenic Rivers Act and several Federal Court rulings (please see comments submitted by Sierra Club Legal Defense Fund, 8/9/88) BLM has the authority to regulate suction dredges operating in a state-owned riverbed. As such, a range of alternatives to reduce the adverse impacts of suction dredges should be included in the EIS.

Conclusions

Due to the many serious inadequacies of the current draft EIS's, we request BLM to make the necessary changes and recirculate revised Draft EIS's. We feel that Alternative C is the only viable option for BLM to pursue for the Fortymile, and Alternative A for Minto Flats. We urge the Bureau to adopt these alternatives as their proposed actions.

Thank you for this opportunity to comment on the Fortymile and Minto Flats EIS's.

Sincerely,

Emily Barnett

Emily Barnett
Alaska Issues Specialist

59-1 See Section 2.4.

59-2 The projections for the price of gold and the number of active mines were made to predict mining activity over the next ten years. The price of gold is one of the major factors that influence the level of mining activity, so a gold value ($600 per ounce) that would reflect an increase in the number of mining operations was selected for the analysis of cumulative impacts. A gold value lower than today's value could as easily been chosen as the "reasonable" value, and a lower value would most likely result in a reduction of mining activity compared to the current activity level. However, a cumulative impact analysis of reduced mining activity would be of limited value if the actual level of activity increased, especially since the future of gold values is so difficult to predict. The $600 per ounce price reflects a significant increase over gold's present value, yet is below the all time high of approximately $800 per ounce. The same methodology for forecasting mining activity was used in the draft and final EIS.

59-3 Section 2.3.2 has been rewritten to clarify a misconception that a zero discharge water treatment system would be required to meet the water quality performance standards. In actuality, the water quality standard for the Proposed Action could probably be achieved by a mine with a properly operating simple settling water treatment system and an EPA variance for turbidity. The cost figures for water treatment have been revised to reflect a more appropriate sized mine that processes approximately 50,000 cubic yards per year versus 150,000 cubic yards.

59-4 See Chapter Four for detailed information on environmental consequences.

59-5 To assess cumulative impacts to each resource for each alternative, the EIS considers the number of mines projected to be operating, in conjunction with the applicable reclamation and water quality standards.

59-6 The EIS does not assume that mining will cease after 10 years, but analyzes a 10-year time frame as a reasonable expectation of future impacts. We expect similar impacts to continue for additional 10-year periods using the alternatives and current mining technology. Ten years is the cycle for revisiting RMPs. As knowledge of the area increases, and mining technology changes, it is reasonable to assume that impacts from mining will be different, and should be re-evaluated at that time.

59-7 See response 59-6

59-8 Additional details will be covered in the Record of Decision. See Section 2.3.1.

59-9 Regulations for process water treatment systems currently require that such systems be sized sufficiently to handle predicted flood flows. Operators with valid claims have a right to operate while in compliance with existing legislation and regulations. As placer deposits occur in floodplains, any requirement eliminating mining from floodplains would abrogate those rights.

59-10 See responses 58-21 and 58-22.

Concerning the language of the Environmental Impact Statement for the 40 mile River Drainage)

If Hollywood were to contract you to write a script advocating and initiating the end of placer mining in Alaska, you could not have done a better job. Congratulations for your part in advancing the decline (economically) of the United States. Maybe we'll get a Democratic president that will open more food stamp offices, and hire more government employees to staff them.

Sincerely

Michael S. Hromadka
Vice-president
Kachemak Mining Corp
Box 71
Chicken, Alaska
99732

AUG 15 2 30 PM '88

BLM AK SO 974A

9 AUGUST 1988

MICHAEL J. PENFOLD
ATTN: RICHARD DWORSKY, PROJECT MANAGER
BUREAU OF LAND MANAGEMENT
ALASKA STATE OFFICE
701 C ST
BOX 13
ANCHORAGE, AK 99513

DEAR SIR

REFERENCE: DRAFT CUMULATIVE ENVIRONMENTAL IMPACT STATEMENT
FORTYMILE RIVER PLACER MINING

I BELIEVE THAT ALTERNATIVE "D" SHOULD BE THE PREFERED ALTERNATIVE.

ALTERNATIVE "D" WOULD PROTECT THE FORTYMILE NATIONAL WILD AND SCENIC RIVER CORRIDOR FROM SILT BUILD UP AND KEEP THE WATER QUALITY, WHICH SHOULD BE IMPROVED. IT WOULD ALSO PROVIDE A BETTER BUFFER FOR THE WETLANDS IN THE FORTYMILE RIVER WATERSHED. ANY STREAM THAT HAS BEEN PREVIOUSLY DAMAGED SHOULD BE REBUILT TO THIER ORIGINAL CHANNELS.

SINCERELY

Harry E Wilson

HARRY E WILSON
2120 N CALLOW AVE
BREMERTON, WA 98312-2908

I

Aug. 8, 1988

Comments on 40 Mile E.I.S.

Dear Sirs:

As a small miner in the 40 Mile mining district located on Dome Cr., I am concerned about this whole mess.

First of several concerns is that of classifying the 40 Mile river as wild & scenic; that should never have occured.

With the proposed regulations and restrictions it is making it totaly impossible to placer mine in this area. I feel that the multiple use of anything or area is the best for everyone as citizens of the U.S.A. and Alaska.

On the matter of Settleable Solids and Turbidity, I want you to seriously concider the amount of each of these that

the whole placer mining
industry introduces into our
major River systems in this
State; now compare this amount
with what "mother nature" has put
in these same rivers.

It becomes real apparent that
the amount that the miners
put in is infinitesimal.
The major rivers I mention, a few
would be the Copper, Tanana,
White, Yukon, Matanuska - etc.

Please send me the final E.I.S.
and R.O.D. on the 40 Mile

Thank you,
Richard Hough
244 2nd St.
Wrangell, Alaska
99929

David L. Allison
3140 Nowell Avenue
Juneau, Alaska 99801

Placer Mining EIS's
c/o Richard Dworsky
Bureau of Land Management
701 C Street, Box 13
Anchorage, AK 99513

This letter is to request your consideration and adoption
of a program ① to eliminate, or at least minimize,
existing adverse effects which placer mining has
caused to subsistence uses and resources
② to ensure that water pollution control measures
result in full compliance with state and federal
water quality standards and that BLM NOT ALLOW
degradation of the Water Quality of National Wild
and Scenic Rivers
③ To adopt Alternative C in Birch Creek,
Beaver Creek and Fortymile EISs
④ to adopt Alternative A in the Minto Flats EIS
⑤ to ensure reclamation of the mined areas
in the shortest possible & feasible time as provided
in Alternative C. Provide safe passage for fish
Through mining Areas and minimize non-point
pollution from run off from mine sites.

My travels through the interior over the past 11 years have
allowed me to see the best and worst of mining,
reclamation and regulation and enforcement. If
the backlash against mining is to be minimized
so responsible placer mining can continue in
the future, federal land managers must adopt
stringent and effective regulatory measures. The
cost causer and the person who profits from the
extraction of public resources must pay the
direct price of reclamation – prompt reclamation.
These mining activities are never again going to
out of the public eye. The world has shrunk
too much.

Thanks for your efforts – often criticized even by
me, to fulfill your professional responsibilities to the
land and to the public.

David L. Allison

management plans which will recoginze the concerns of all user groups as well as provide a safe and healthy atmosphere for animal and plant populations.

Thank you for this opportunity to comment.

Sincerely,

Mary Zalar

Mary Zalar
230 East Birch Hill Rd.
Fairbanks, AK 99712

BLM AK SO
AUG 16 10 24 AM '88

64 Continued

Citizens' Advisory Commission on Federal Areas

515 Seventh Avenue
Suite 310
Fairbanks, Alaska 99701
(907) 456-2012

August 12, 1988

AUG 16 10 23 AM '88
BLM AK SO

Mr. Michael Penfold
State Director
Bureau of Land Management
701 C Street, Box 13
Anchorage, Alaska 99513

Dear Mr. ~~Penfold~~ Mike:

The Citizens' Advisory Commission on Federal Areas has completed its review of the Draft Cumulative Environmental Impact Statement on Placer Mining in the Fortymile River. We offer the following brief comments for your consideration as the Bureau of Land Management works toward a resolution of the problems associated with placer mining activities within this river drainage.

The Commission truly appreciates the efforts of the BLM staff in preparing this document within a difficult timeframe. The compilation of new and existing data into these comprehensive documents has produced valuable tools for the various state and federal regulatory agencies. Hopefully, much of the general information contained in the draft EIS's can be used to more quickly assess mining plans of operations, not only within the four drainages covered by the documents, but throughout the state, and should result in a more streamlined approval and permitting process.

The Commission supports the intent of the Proposed Action alternative in the draft EIS to allow placer mining activity to continue with an appropriate level of environmental oversight. We do, however, have concerns about some of the assumptions made in evaluating the impacts of the various alternatives.

As we stated in our comments on the Birch Creek draft EIS, we are concerned about the use of a one to one positive correlation of the percentage change in the price of gold to the number of mines which may operate in the Fortymile drainage. There are a number of other variables which must be factored into the equation. Possibly the most important of these would be the regulatory and legal uncertainty that has surrounded placer mining activity in recent years. 65-1
Other factors which may affect the projection of the number of operating mines and resulting impacts would include cost of compliance with the EPA's recently promulgated guidelines for effluent discharge, new mining techniques, and inflation. The discussion of the methodology used for forecasting the number of mines and roads and acres of reclamation and disturbance in Appendix B-1 does address these factors to a degree, but it would be helpful to expand this section.

While the effects of all these factors may be virtually impossible to predict with any degree of accuracy, some adjustment may need to be made to the one to one correlation between the price of gold and

Mr. Michael Penfold
August 12, 1988

Page 2

the number of mines operating and the subsequent impacts. This one to one correlation should not be relied upon as the sole basis for projecting placer mining activity in the Fortymile drainage. Overall, considering that these kinds of uncertainties and variables do not lend themselves to easy analysis, we believe that the BLM has done a good job in providing an examination of possible future mining development scenarios.

Another element of the draft EIS which may need to be modified is the analysis of the total effects of placer mining activities, including state and private claims. In Appendix B-2 and elsewhere in the document, the implication is that there are no requirements for reclamation on state mining claims. It is our understanding that the state does require mine operators to meet certain conditions for the handling of top soil, grading of tailings, construction and use of roads and trails, and minimizing impacts to drainage systems and fish and wildlife resources.

Nearly half of the active claims in the Fortymile drainage are on state or private land. By assuming that no reclamation will occur on state mining claims, the draft EIS has probably overstated the cumulative effects of placer mining within this drainage. The final EIS needs to recognize and discuss these state requirements and, if necessary, adjust conclusions regarding the levels of cumulative impacts accordingly.

Additional state requirements that should be incorporated into the final EIS are those for the reclamation or reestablishment of waterbodies affected by mining activities. Adherence to these standards by mining operations will result in fewer adverse impacts to the aquatic environment. In turn, the cumulative impacts will be fewer. Conclusions in the final EIS should then be modified, as appropriate.

In conclusion, we found this draft document to be well written and useful in understanding many of the existing and potential problems associated with placer mining activities within the Fortymile River drainage. By expanding the analysis in a few areas, we believe the BLM will be able to satisfy the concerns of the courts by producing a final EIS that thoroughly examines all aspects of the cumulative environmental impacts of placer mining within the drainage. Further, we believe that the final EIS will demonstrate that placer mining can continue in an environmentally sound manner without significant adverse impacts to other uses.

Sincerely,

Stan Leaphart

Stan Leaphart
Executive Director

BLM AK SO
AUG 16 10 23 AM '88

65 Continued

65-1 See response 58-26.

Fred Heflinger
P.O.Box 82390
Fairbanks, AK 99708

Fortymile River EIS
c/o Richard Dworsky
Bureau of Land Management
701 C St.
Box 13
Anchorage, Alaska 99513

Dear Sir:

Regarding your draft EIS you have to go with the proposed alternative.

In Section 3.11 Economics. the factor you are using is I think unreasonably low and should be more like 4 or 5.

66-1 Also, most of us miners have visitors during the summer, in my case about 12 visitor days per year, and this economic impact should be credited to the miners.

Then, why is it that we bother the animals but recreationists and hunters do not?

I also think we provide more moose browse on old worked areas than we are given credit for and it is a positive benefit — no intentional fires need be started to create it.

Also, I know at testimony in Chicken, Alaska ~~that not so many people~~ it was stated no ~~nearly~~ nearly so many people use the river as The Sierra Club Says.

Thank you

[signature]

66 Continued

66-1 See Section 3.10 "Effect of Mining on Recreation Opportunities."

Larry R. Taylor
P.O. Box 101
Eagle, Ak 99738

EAGLE, AK
AUG 12
1988
USPO

Fortymile River EIS
Att: Richard Doworsky
Bureau of Land Management
701 "C" Street Box 13
Anchorage, Ak 99513

Aug. 11, 1988

Re: Written comments on BLM "Fortymile River EIS"

Dear Mr. Dworsky,

This letter is not as extinsive as I'd like it to be, but we did not receive our copy of this draft until the 25th of ~~August~~ July as it was not mailed from Tok office until the 21st. I therefore did not have as much time as I would have liked to read through the material before the public meeting in Chicken on the 3rd of Aug. I did make a public statement at that time, but would like to take the time to make a few more comments now that I have read through the EIS.

For the most part I have found the EIS to be; factual, and interesting. It shows alot of time and effort. However I found a few points that could be mistaken or misleading, and I'd like to comment on these points:

1. Water standards:
It is not clear how these water standards are set. It was not mentioned that the water in the Fortymile drainage is highly affected by the season rain. Even a few inches of rain in any area can raise the river's and creek's levels 12 inches or more over night. This water is very muddy and remains so for many days after a rain shower. 67-1

EIS mentions receiving many complaints about water quality on the Southfork that was attributed to Jack Wade, etc.; How ever in all fairness it was not mentioned whether or not this complaint was made by a person who knew the area. Touriest who complain about the water quality often mistake muddy water from rain for mining activity. Also 3 out of 5 mistake the color of the water as being dirty, they do not know the water is in fact yellow in color by nature and not clear like city tap water. Also I've heard many people comment on the fact that "some one up river must be doing laundry because of the soap suds in the creeks and rivers," this to is a mistake as this foam is natural to these waters all summer. 67-2

So I question wheather or not BLM personally checked these complaints to determine if the water quality was indeed from mining activity.

2. Decrease in moose and caribou population:
It was not mentioned in the Eis that the hunting presure from hunters coming into the area was so great in the early 1970's that Fish and game determined it was necessary to close the Fortymile to all hunting. This had nothing to do with mining as; decrease in population has been more attected by hunting presure and the fact that the natural moose food has been over grown naturally by trees and food less desired by moose.

Also wolf population was so high Fish and Game issued a program to "air raid" wolves to save the moose and caribou. Miners have less impact on the moose and caribou population than the EIs would lead us to believe.

3. Fish in the area:

67-3 It is not stated in the EIs that the Fortymile drainage is not a Salmon spawning area because the rivers freeze dry in the winter. It is a fact that the eggs spawned in the rivers, or creeks, must have water running over them in order for the eggs to hatch in the spring. This does not happen in the rivers, because the water freezes to the bottom of the river in some places; other places the water level is so low there is no water; and water caught in deep holes is left standing with no water flow until spring breakup.

This is why there is no subsistance fishing in the Fortymile area; which leads me to sport fishing for Grayling. The Grayling do not stay in the Fortymile river for the winter because of the same reasons. They return to the Yukon River for the winter, and return in the spring to the smaller creeks for spawning. As they are subjected to the muddy waters of spring breakup and the muddy waters of summer rains without much difficulty it is hard to imagine Fish and Game does not have more information on the effects of turbity on the fish in the Fortymile river. As a sport fisherman for the past 18 years in the Fortymile I have not noticed any decline in the number of Grayling I'm able to catch in the summer; miners or not, high spring breakups or not.

4. Reclamation:

Mining done in the 1930's when no reclamation was done had all ready regrown with tundra and large tees before 1970, if you did not know that area had been mined it would be impossible to tell that it had been worked by miners or anyone you disturbed the land. This is a clear indication that Alaska is capable of regrowth without useing commercial seed to replant growth. In fact seed that is not native to the area that could be intruduced by replanting mined or distrupted areas by state highways etc., I feel could be more detromental to the native growth from ever making a come back to a more natural state.

5. Recreational uses:

There are only two roads coming into Alaska. Persons coming into the state from Dawson will usually leave the state through Beaver Creek and vis versa, I have found this is because there are few roads in Alaska compared to the land mass. The area is so large that tourists visiting Alaska have little time to travel all the side roads, they prefer the main highway system which circles through the state. I've found that the tourists who come to the Eagle and Chicken area are looking for the gold mining history and the chance to pan for gold and dredge. And all those who have traveled the Taylor highway felt it was worth the trip.

The Fortymile River is a nice river to float, but few people take this opportunity, for these reasons: Few tourists traveling the highway are prepared to stop off and float the river for several days, those who do are persons who come to Alaska to spend their vacations viewing the state from the vast water ways. The Fortymile River is remote enough that residents of Alaska must plan on floating the river on vacation time, driving distances from Fairbanks and Anchorage are such that it is almost impossiple to float the rivers on long weekends.

Because of these factors the Fortymile is not a highly popular river for large numbers of floaters. Those persons floating the river are aware that it is a mining area and appreciate seeing the ~~ming~~ mining in the

Fortymile, Chicken and Eagle area. I feel that it is not the mining in the area that determines the number of floaters using the rivers, but rather a combination of remote location, and lack of interest, and also the law suit by Sierra Club. The toruist we've talked with are unsure of what they can do and can't do, because of the camping permits.

6. Camping permits:
The EIS seems to imply that only suction dredgers are long term campers. When in fact the camping permits are issued to ~~any~~ any persons camping in the Fortymile area, for 10 days or more. This means hunters, floaters, or persons wishing to spend the summer in the Fortymile area. This has confused many tourist traveling to the Fortymile this summer, they are not permited to camp for more than 10 days because there are no more camping permits. This has been one reason there are fewer floaters and recreational users of the river this year, it is unfair to imply that mining maybe the cause of the number of persons using the area.

7. Methodology;
The number of expected future placer miners was figured in the EIS by using the price of gold. "As the price of gold increases or decreases the number of miners will increase or decrease accordingly." This does not take into account the factors of why there were more miners in the area in the days of $17.00 and $35.00 an ounce gold prices, than there is today when the price is $475, (highest price in 1987).
There are many factors to consider here that are not affected by the price of gold. Some of the factors are: there are more laws governing mining today, than in the past. There is more permits and paper work to fill out these days and fewer people are able to handle the increased paperwork and are willing to forego mining regaurdless of the price of gold. There is no indication that in the future rules, laws, regulation will be less. Also more and more people who have come to the area to mine, expecting it to be easy work mining this $475.00 gold have found that it takes a great deal of hard labor to get the gold out of the gournd. Few people today are willing to work this hard no matter the price of gold.

Some portions of the EIS could be miss interperted unless a through reading of the EIS is done (~~by~~ person not knowing first hand the area involved.) More clairifaction on some points should be made and taken into consideration. Perhapes this clairifaction is available in other documents and information collected by other agencies, but the lack of this information in this EIS makes it appear missrepresentive of the total environment.
3.1 Million acers is a very large area compared to the mining activity now and the possible future mining. There is more that I could possibley add but this letter is beginning to look like an EIS draft. And my only objective was to point out the things which I felt need more clairifaction. There were many miners at the meeting in Chicken who had alot to add and it is hoped that they will pick up in areas that I may have missed.

Thank you.

Respectfully submitted,

June M Taylor
JUNE M. TAYLOR

Larry R. Taylor
LARRY R. TAYLOR

67 Continued

Copies sent to:

Clerk of Court
All; Pam, Docket Clerk
701 "C" Street, Box 4, Room B-240
Anchorage, Ak. 99513

Dean Dunsmore
Land & Natural Resources Div.
Room F-249, Mailbox 9
701 "C" Street
Anchorage, Ak 99513

James S. Burling
Pacific Legal Foundation
807 "G" Street, Suit 200
Anchorage, Ak 99501

Philip S. Bernett
Sierra Club Legal
Defense Fund, Inc.
325 Fourth Street
Juneau, Ak 99801

PS.

A point to ponder: This century is so concerned about covering our "tracks of passage", I can't help wondering what it will be like for a person in the next century looking through our historical ruins. I get rather excited walking through the woods and stumbleing across an old log cabin half collapsed, and finding a Log Cabin Syrup can or unbroken bottle. I can't help wondering if I won't be disapointing someone in the next century by taking away the fun of finding an old Spam can or Jiffy peanutbutter jar.

67-1 The water quality performance standards were based on the current and proposed State and EPA standards at the time the draft EIS was written.

67-2 The complaints about reduced water quality on the South Fork were received mainly from suction dredgers operating there.

67-3 As indicated in Section 3.7, the Fortymile River does not appear to support an established spawning population of any salmon species.

As also indicated, wintering areas for grayling may exist throughout the drainage, but only limited field studies have been conducted so far.

Joseph D. Mitchell
Polly Creek
General Delivery
Eagle, AK 99738

EAGLE, AK 1988 USPO

Dear Sirs,

My wife Mdna and I have been comming to the FortyMile River for nine years. We bring tourists here and we also have two dredges. We stay approximately six weeks every summer. This year we had eight tourists and four college students. Three students were from Denmark and one from Wisconson. We pay the students air fair and board. The students receive a percent of the gold.

The forty mile river was floated approximately ten times by these people and they enjoyed our cabin very much. We use the river for a multi purpose and enjoy it as much as anyone in the world. The rest of the year we live in Brookville, Pennsylvania.

The EIS report as I see it was never truly feild tested. To compare small tailing piles on the fortymile river with those in Fairbanks and Dawson and etc., is not a good or fair compairson.

I feel that the BLM had an excecellant policing as far as camping on the fortymile river and it was a very well controlled system. We in fact police the river for garbage and etc. Especially after rain when the river comes up. The Fortymile is and should always be a multi use river. For a few social elite to have control of the river for their own personal selves is utterly ridiculous and extremily selfish position.

This year from the Forks of the fortymile river to the bridge, there have been three dredges running. I have been here since the 28th of June and leaving today, the 10th of August. I and the people here have seen only five floaters by. I'm sure there have been more, but not the many more.

The thing that really disturbes me the most. The LIES, FALSE STATEMENTS, HALF TRUTHS, INVIDICUS STATEMENTS ETC. of the social elite in regards to the dredges on this river. The United States of America has been built on truth and trust, and for a few selfish people to confuse these issues with lies is un-American. To Lie to a Federal Judge is going against what made this country great. These people should be held for a criminal offense for contempt of court. This EIS Report should be totally dropped and people allowed to go back to Cat Mining and dredging. until a real feild test is complete.

BLM is truly trying to do a good job, but appears to be some what intimidated by a few rich people, their job is also to protect the rest of the people and miners. This river is for everyone.

Sincerely,

Joseph W Mitchell

Joseph D. Mitchell

cc: Richard Dworsky- BLM
Philip S. Barnett - Sierra Club Legal
James S. Burling - Pacific Legal Foundation
Dean Dunsmore - Land & Natural Resources
Honorable James A. Von Der Heydt - Cleek of Court

68 Continued

Mrs. Mona Mitchell
R D # 1 - Box 460
Brookvile, PA 15825

EAGLE, AK
AUG 12 1988
C.P.O

My husband and I spend our summers at Polly Creek on the Fortymile River. I feel that the BLM EIS Report on the Fortymile River should have the following changes.

(1) PROBLEM STATED IN REPORT:

A certain number of 37 miners, both cat and dredgers was used for an example. I feel that NO numbers should be stated, only "MINERS" should be stated, may be made a total number of miners a law.

(2) PROBLEM ALTERNATIVES A, B, C:

CATMINING should be graded and let regrow at a natural growth. This regrowth will stablelize the ground from erosion naturally.

DREDGING: The fast water flow of break up will naturally relocate any traces of tailings.

(3) PROBLEM ALTERNATIVE D:

Alaska was built greatly by the history of gold mining. All history of mining and stories are pictured all over the state. If a survey was taken of tourists, I feel the main reason for their trip to Alaska was baised on the seeing of actual gold and the operations of removing gold.

The vast number of people are so interested gold and the operations to remove this great metal. People all over ask us miners to see how we get it and of course the gold itself is very interesting to all.

I feel the BLM, is trying to maintain a true interest in the ENDANGERED INDUSTRY OF MINING, in Alaska. I feel that this right should be able to continue at a common sense level.

As you can see that this is not such a rewarding industry by the dwellings and etc. of the normal miner. The main rewarding part of this mining is not the gold, but the finding of the gold that rewards us the most.

We all can follow simple common sense rules. But no one can follow a complicated and expensive rules. We all want to maintain the clean and pretty last fontier of this great state of Alaska.

All we want is to keep America beautiful, safe and clean, as all people in Alaska and the lower 48 states do. Not to mention all people from all over the world who realizes we do have the L A S T F R O N T I E R.

Page 1

Please make the laws simple and common-sense, and no one will have a problem today or 1000 years from now.

Sincerely,

Mrs. Mona Mitchell

Mrs. Mona Mitchell

cc: Richard Dworsky - BLM
Philip S. Burling - Sierra Club Legal
James Dunsmore - Pacific Legal Foundation
Dean Dunsmore - Land Natural Resources
Honorable James A. Von Der Heydt - Clerk of Court

United States Department of the Interior

TAKE PRIDE IN AMERICA

GEOLOGICAL SURVEY
RESTON, VA 22092

In Reply Refer To:
WGS-Mail Stop 423

AUG 10 1988

Memorandum

To: Richard Dworsky, Bureau of Land Management, Anchorage, Alaska

From: Assistant Director for Engineering Geology

Subject: Review of Draft Environmental Statement for Fortymile River Placer Mining, Alaska

70-1 Mitigation of fuel spills should be discussed. For example, specific requirements should include diked and impermeable containment for tanks used to store fuels and lubricants. The diked containment basins should have at least sufficient capacity to hold the full contents of the tank(s) plus precipitation runoff from the maximum 24-hour storm while preserving adequate freeboard. The potential for adverse impacts from sewage disposal methods used at the mines and camps should be addressed and mitigation discussed. The application of generic values for erosion rates in North American forests to virtually the entire basin might produce skewed results. Further consideration should be given to developing local data on sediment dynamics and water quality.

James F. Devine

Copy to: District Chief, WRD, Anchorage, Alaska

AUG 16 1 45 PM '88
BLM AK SO

70-1 See Section 4.12 for an expanded discussion of mitigation. Disposal of sewage at mine sites will occur, as it has in the past, according to ADEC regulations.

United States Department of the Interior
NATIONAL PARK SERVICE
ALASKA REGIONAL OFFICE
2525 Gambell Street, Room 107
Anchorage, Alaska 99503 - 2892

IN REPLY REFER TO:

L7619(ARO-REC)

12 AUG 1988

Memorandum

To: State Director, Bureau of Land Management, Alaska State Office
Attention: Richard Dworsky

From: Regional Director, Alaska Region

Subject: Review of the Fortymile River Placer Mining Draft Cumulative Environmental Impact Statement (DES-88/30)

Major issues addressed by our comments relate to the evaluation of cultural resources, water quality, including the Fortymile River component of the National Wild and Scenic Rivers System, potential placer mining and subsistence. Specific comments are enclosed.

71-1 Appendix A-2, Placer Mining Permit Process, does not accurately represent the review and permitting process of the National Park Service (NPS). We accept the Annual Placer Mining Application as notification of an operator's intent to conduct operations. However, the NPS does not approve plans based only on the submission of that application. It does not provide all the elements required of an operator for a mining plan of operations as specified in 36 CFR 9A. In some cases we grant multi-year approvals so operators do not have to annually submit a plan of operations. Approval is not given until all other permits are acquired by the operator. It is misleading to depict NPS as a separate entity, whose permitting action goes ahead irrespective of the permitting actions of the U.S. Army Corps of Engineers, Environmental Protection Agency, Alaska Department of Fish and Game, Alaska Department of Environmental Conservation and Alaska Department of Natural Resources. We request Appendix A-2 be revised to reflect this information.

We appreciate the opportunity to review the draft environmental impact statement. Questions about comments may be directed to Larry Wright, Environmental Compliance Division, at 257-2649.

Boyd Evison

Enclosure

Enclosure: National Park Service Review Comments of the Fortymile River Placer Mining Draft Cumulative Environmental Impact Statement (EIS) DES-88/30 (8/11/88)

A. CULTURAL RESOURCES

71-2 Summary, Consequences section, page S-5: It is stated that "Cumulative impacts on cultural resources in the Fortymile River drainage do not appear to be significant." We recommend reassessment of this conclusion as it does not appear to be substantiated by the more detailed segments of the document.

71-3 Section 3.8.1, page 3-44: The summary statement, "None of the prehistoric sites have been determined eligible for the National Register of Historic Sites," appears premature. Have any formal determinations of eligibility been conducted? Limited archeological investigations conducted by the NPS within the nearby Yukon-Charley Rivers National Preserve resulted in the discovery of over 100 prehistoric sites. The results suggest that there is a high likelihood that large numbers of potentially eligible cultural resource properties may occur within the Fortymile River area. A formal determination of eligibility for these sites could result in many of them being determined eligible for the register. We recommend the summary statement be revised to reflect the potential for finding sites which may be eligible for the National Register of Historic Places.

71-4 Section 4.8.1, pages 4-49 and 4-50: The proposed level of the cultural resources investigation needs to be reconsidered. The Class I Inventory can be accomplished by a literature search and telephone call to the Alaska Heritage Resources Survey files to check on the existence of sites identified by the National Register of Historic Places. The EIS indicates there are no National Register sites listed for this region. Therefore, if the site investigation process stops with the Class I Inventory, it appears that any cultural or paleontological resources located in unsurveyed areas are not going to be considered. The issue should be clarified by the EIS. Compliance with Sections 106 and 110 of the National Historic Preservation Act of 1966, as amended, and 36 CFR 800 should also be addressed. We recommend that on-site cultural resources surveys consistent with federal law be conducted prior to the approval of any plan of operations in the project area.

71-5 Section 4.8.6, page 4-51: The EIS states that "Since no testing and little survey would be done prior to most surface disturbing activity on mining operations, there is a possibility that cultural or paleontological resources would be impacted or destroyed without the operators' knowledge" and "Historic mining resources, which are not generally protected by federal legislation, can and have been destroyed." This appears to

indicate that the Bureau of Land Management (BLM) does not plan to adequately survey for cultural resources prior to permitting mining operations. We are not aware of historic mining districts being excluded from the protection of the Section 106 process. Even the topography of the historic mining districts is considered a significant resource (Francaviglia 1988, "The Ultimate Artifact: Interpreting and Evaluating the Man-made Topography of Historic Mining Districts" by Richard V. Francaviglia, a Paper Presented at the Annual Meeting of the Society for Historical Archaeology). We recommend that plans be made to conduct an adequate and appropriate investigation of cultural resources as required by the National Historic Preservation Act. 71-5 cont'd

B. WATER QUALITY

Section 2.3.2, page 2-7: Regarding the alternatives presented, we agree that in this situation the "zero discharge" water treatment technology requirement is preferable to chemical treatment in the settling ponds. Cumulative impacts notwithstanding, use of the current standard of 0.2 ml/l of settleable solids and the "5 NTU standard" for turbidity in the effluent is appropriate. Careful review of the plans of operations during the various permit processes and a vigilant approach to inspection and monitoring would help assure compliance with these standards.

However, we disagree with the use of alternative standards, such as the addition of mixing zones and variances, as alternatives for the EIS. Implementation of such standards could add to the already substantial water quality degradation discussed throughout the water resources Environmental Consequences section. Also, BLM does not have regulatory control over the issuance of such variances nor is implementation of the proposed mixing zones under its authority. By proposing these alternatives, individual mines may be permitted under less stringent effluent standards rather than evaluating the effects of additional operations under the existing effluent guidelines. 71-6

Section 2.3.5, page 2-11: We recommend that the alternatives not include proposed changes in water quality standards or variances over which BLM has no authority.

Section 4.4.1, page 4-14: It appears that in some cases water resource impact conclusions are drawn that are not supported by the information presented in the EIS.

For example, the analyses and discussion of non-point sediment loading do not appear to support the conclusion that such inputs

are not expected to be significant. Figure 4-1 (p. 4-17) shows that, for the proposed action, 20 active mine sites on federal land will contribute 34,500 tons of sediment annually to Fortymile River by 1998. This is a 25% increase over "background" contributions from forested land, abandoned mine sites, and mines on state lands. Figure 4-1 also provides a combined figure (state, federal, and presumably private mines) for sediment loading from access roads and other associated construction. Assuming this source is distributed equally over the 37 total mines anticipated under the proposed action, the annual contribution from this source for mines on federal land would be an additional 52,119 (20/37 x 96,420) tons of sediment. This brings the annual sediment load associated with mines on federal land up to 86,619 (34,500 + 52,119) tons, or a substantial 63% increase over "background."

71-7 The Conclusions section, page 4-14, appears to downplay the impacts of increased sediment as well as increased turbidity and associated chemical contamination (e.g., heavy metals). This is supported by statements (pages 4-14, 4-13) such as "The contribution of sediment from non-point sources is unknown ... but is not expected to be significant" and "... with the possible exception of surface flow from large storms, the downstream effect from non-point sources under the Proposed Action would be indistinguishable from expected natural conditions." This hypothesis distorts the analysis since such storms are the way that the sediment load analyzed in Figure 4-1 enters the river. We suggest the discussion of the non-point impacts cover what occurs during storm runoff rather than what occurs at other times.

Statements on pages S-5 and 2-17 indicate that the overall cumulative effect of total suspended sediment increases cannot be determined. This needs to be substantiated. We suggest that on-site research, use of available literature and modeling techniques can and should be employed in this task. The cumulative effects of the alternatives need to be adequately addressed. Justification is needed for selection of the alternative that appears to provide for maximum mining and substantial environmental degradation.

The increase in sediment loads, the likely deterioration of chemical water quality (including metals), the increased turbidity, the cementing of streambeds and other impacts noted in the water resources Environmental Consequences section for most of the existing alternatives demonstrate deleterious impacts upon the water resources of Fortymile River. The Environmental Protection Agency's anti-degradation policy regulations (40 CFR 131.12) would, therefore, appear to be violated since

several water quality standards would be routinely exceeded. In some areas, impacts may last for 50 years or longer, and effects would stretch into the Fortymile River component of the National Wild and Scenic Rivers System. Such impacts are contrary to the protection provided under the National Wild and Scenic Rivers System (Final Revised Guidelines for Eligibility, Classification and Management of River Areas, Federal Register, Volume 47, Number 173, pp. 39454-39459). These guidelines call for maintaining water quality or, if needed, taking steps to assure that applicable Clean Water Act standards are met. We suggest that BLM adopt a more resource protective approach in the EIS that incorporates existing effluent guidelines and best management practices designed to control the non-point runoff problems.

Executive Order 11990 (Protection of Wetlands) requires the BLM to minimize the destruction, loss, or degradation of wetlands and preserve and enhance their natural and beneficial values when carrying out its land management responsibilities. Chapter IV, Environmental Consequences, does not appear to adequately address the loss of wetlands associated with the mining process. The executive order also requires BLM to show that no practicable alternative to the proposed action exists and that measures are taken to minimize harm to wetlands resulting from the proposed action. The EIS should demonstrate compliance with the executive order. This would include a description of the potential effect of each alternative on wetlands and the identification of those measures being considered to minimize harm. 71-8

C. MINERALS MANAGEMENT

Section 1.1, page 1.1: The EIS should analyze any cumulative or synergistic environmental effects of placer mining within the Fortymile or Mosquito Fork drainages upon those parts of the Fortymile River component of the National Wild and Scenic Rivers System. We suggest that the EIS include an evaluation of the effects of placer mining on the Wild and Scenic Rivers System values of the river. 71-9

Section 1.3, page 1-3: The meaning of the statement, "This EIS will focus on the portions of the Fortymile watershed shown on the Status Map in this chapter," should be clarified. The referenced watershed on the Status Map has 70 "portions," some of which appear to be within the Yukon-Charley Rivers National Preserve, according to the Tributaries and Main Physical Features Map in Chapter One. 71-10

Chapter One; Area Map, Tributaries and Main Physical Features Map: The maps depict the project study area and Fortymile River 71-11

71-11 cont'd watershed. The watershed is actually much larger than shown on these maps and includes the Mosquito Fork drainage which represents approximately 20% of the Fortymile River watershed. But the Mosquito Fork drainage is not included within the study area or shaded as part of the watershed. We recommend these maps depict the entire watershed. Explanation should be given in the EIS why the Mosquito Fork drainage is not considered within the scope of analysis.

71-12 Sections 2.5 and 4.3, Figures 2-7 and 4-6: Past mining activity should be given more consideration in assessing cumulative impacts.

71-13 We recognize that Figure 4-6 apparently includes past disturbance, but in the Environmental Consequences discussion (section 4.3) only future disturbance is analyzed in assessing the impacts of the various alternatives. Disturbance on both reclaimed and unreclaimed lands lasts many years and must be included in the examination of impacts resulting from each alternative.

71-14 Section 2.5.1, page 2-16: The statement, "There should be no significant impacts on mineral resources," occurs here and that theme appears to be carried into the Environmental Consequences discussion. There it shifts to a discussion of development potential of mineral resources. If mining occurred at those projected levels, it seems there would be impacts to placer gold availability for development. Further, the worst case scenario projects 10 acres mined on each of 170 active mines for 10 years, yet Figure 2-8 shows no significant impact on development under the minerals component. If information available to BLM shows no significant impacts, we suggest that it be presented in greater detail in the EIS.

71-15 Section 3.6, page 3-37: The environmental consequences of existing permanent and primitive roads and trails in the Fortymile River watershed are considered in terms of effects on wildlife habitat. The distinction is made that the effect of permanent roads is habitat loss while primitive roads and trails result in short term disturbance. We suggest that in this analysis BLM consider that permanent roads have corridors subject to periodic disturbance and that some primitive roads and trails have doubtless resulted in habitat loss. This suggestion also applies to the analysis of effects of road and trail construction and use on wildlife and habitat in each alternative on pages 4-29, 4-31, 4-33, and 4-35.

71-16 Section 3.10, pages 3-58 and 3-59; Section 4.10.1, page 4-61; Appendix C-3, page A-11: The EIS discussion of the application of Visual Resource Management Classifications (VRM Classes I, II and III) in the project area is confusing and should be

clarified. On page 3-58 it is stated that the visual resource management objective for the Fortymile River basin is Class I and that the "... rest of the area ... is generally considered to be Class II." However, page 3-59 indicates that "Visual management of the Fortymile River corridor is based on Class II objectives ...." Appendix C-3 indicates "Visual resource management in the Fortymile River watershed ... includes management of the 'wild' portions as VRM Class I and the 'scenic' and 'recreational' portions as VRM Class II." According to Appendix C-3 VRM Class III "... applies to the remainder of the Fortymile Wild and Scenic River System ...." We suggest that a map be used to clarify the application of the VRM classifications. 71-16 cont'd

Chapter IV, page 4-1, and Appendix B-1, page A-4: In the discussion of the effect of the price of gold on future operations the rationale for selecting a gold price of $600 per ounce needs to be clarified. The price appears to be arbitrarily chosen. In Appendix B-1 it is stated that "Using these estimates, we reasonably expect that by 1998, the price of gold will be in the $600 per oz. range." Since the discussion prior to this statement addresses the relationship between gold price and number of miners, it is not clear which estimates are referenced and why.

If BLM projects this gold price as an expected rise due to inflation or if this is a projection in terms of 1987 dollars, it should be so stated. It appears likely that with an inflationary rise in gold price of 23%, a corresponding rise in the number of mines may not occur because inflation could similarly raise operational and other mining costs (i.e. materials, food, wages, etc.) keeping the number of mines static or even causing decline. 71-17

Chapter IV, page 4-2, and Appendix B-1, page A-4: There is an apparent discrepancy in the price of gold ($600 to $2,000) being projected for the worst case scenario. On page 4-2 it is stated that a projected worst case scenario "... could occur if unforeseeable circumstances caused this high level of activity, such as the price of gold increasing to $2,000 per ounce." However, in Appendix B-1 it is stated that a projected gold price of $600 per ounce "... constitutes the worst-case scenario projecting over the next ten years." Clarification is needed whether the analysis is based on $600 or $2,000 gold prices. In addition, if gold were $2,000 per ounce other inflationary factors should also be considered such as the cost of fuel, equipment, materials and food. If such other factors were considered, they should be listed as assumptions in Appendix B-2, page A-5.

71-18 Section 4.1.6, page 4-4: The exception stated for Alternative A appears to be an error. Alternative D is the no mining (no "federal mining") alternative and projects the condition where there would not be "some minimal alteration of original site aspect" on federal lands. Clarification is needed.

71-19 Section 4.5, page 4-18: The requirement of mining methods, such as zero discharge or chemical treatment, which allows the retention of fine soils on site, should be considered. The presence of fines is essential for the timely revegetation of mined sites. As depicted in Figure 4-3, as more fines are lost from the soil the regeneration potential and rate decrease significantly. Simply requiring the retention of top soil is not adequate. In the floodplains and on the previously mined lands (1,050 acres) there is not sufficient top soil present on the surface. On the majority of lands to be mined nearly all of the fine soil particles are present within the gravel matrix.

71-20 Appendix B-4, page A-7: It appears there is a document assembly error. Text from the Minto Flats Placer Mining Draft Cumulative Environmental Impact Statement is included.

D. SUBSISTENCE

71-21 We suggest that a Table of Contents be included in the EIS. The location of the ANILCA Section 810 analysis and findings should be clearly identified.

71-22 Section 3.9.3, page 3-54: Moose are the primary subsistence wildlife species. Their populations in the watershed at this time are low. There will likely be further reduction in population due to loss of habitat and some increase in sport hunting from mining personnel during the 10-year period the mines will be operating. It is important that the cumulative impacts on moose populations and habitat be thoroughly considered by the EIS.

Figure D-2(a), page A-16: The Fortymile caribou herd migrates between Yukon-Charley Rivers National Preserve and the Fortymile River watershed. Management and protection of this herd is part of the mandate of the Preserve. We suggest the development of a plan for the monitoring and enforcement of the mitigation measures identified in Figure D-2(a). The plan should be described in the EIS.

Section 3.9.3, page 3-55: The EIS suggests that the reason no salmon occur in the Fortymile River in Canada may be related to ongoing or past mining. The same assumption can be made of fish populations in the Fortymile River in the United States. The EIS

also indicates that the absence of subsistence fishing may be due to the lack of appropriate fish populations. It states that sedimentation and cementing of stream beds has resulted in water courses with no fisheries values. The conclusions drawn in the assessment of mining impacts on aquatic communities need to be revised to be consistent with the extent of the impacts. It is reasonable to assume that people might be using the area today for subsistence if mining had not reduced the fish populations.

The elimination of fish populations from the stream courses as the outcome of dredging and mining is predicted. At this time subsistence fishing is low in the Fortymile watershed and loss of the fishery resource may not impact subsistence fishing. However, extermination of the fish population removes an option for subsistence fishing now and into the future. Circumstances may arise creating a need for this fishery resource which then cannot be met. The EIS should evaluate the past, present and future effects of placer mining upon the subsistence user. 71-23

Section 4.9.1, page 4-56: Clarification of the justification given for the Section 810(a) Finding statement is needed. Information is contained in the EIS which appears to conflict with the statement. The effects of loss of fish habitat and minor subsistence fishing due to the influx of miners are among the factors that should be reconsidered.

71-1 Appendix A-2, Placer Mining Permit Process, was not Intended to represent the review and permit process of the NPS.

71-2 Cultural resources surveys have been conducted in the drainage, particularly along the Fortymile and its forks, for several years and little prehistoric material has been discovered. Prehistoric surface sites have been investigated along the Taylor Highway by archaeologists on contract for DOT/PF and for BLM, but nothing significant has been identified. Most of the cultural resources identified in the drainage which might be impacted by mining consist of historic trapping/prospecting cabins and old mining sites. Many of these are located on active operations and have been used and/or maintained over the years by the miners. Requests for determinations of eligibility were done on many of these sites by BLM several years ago and most of them were determined not eligible for the NRHP.

A river survey was conducted in 1987 to determine the impact of long-term camping by suction dredgers on the old cabin and mining sites along the river and the conclusion was that, with BLM's active permit and monitoring program, the users were actually helping preserve many of the sites. In addition, many of the resident miners in the drainage have been helpful in providing historic information about historic cabins and mining sites.

71-3 We are aware of the NPS investigations and discoveries in Yukon-Charley, although there is no reported or published information available on those findings. As of this last winter, indirect information did not lead one to believe that any of the Yukon-Charley sites had been found eligible to the NRHP. However, due to the geographic proximity of the drainages, we have made a point to carefully check for cultural resources in the Fortymile drainage. Given the river survey results, the work along the Taylor Highway, the cultural literature for the drainage, and the district archaeologist's field examinations of virtually every active mining operation in the drainage, it does not appear that the potential for impacts by placer mining on cultural resources in the Fortymile drainage is significant.

This may change if mining activity were ever to take place in the higher country in the drainage but it would probably not be placer mining and would thus be beyond the scope of this EIS. To date there is no indication that there is a potential for gold placer mining in those areas.

71-4 BLM routinely does Class I inventory work (literature searches) which includes consideration of data from the Alaska Heritage Resource Survey. Additional inventory work, as appropriate, also is conducted in mining areas. Such work in 1988, for example, included on-site visits to active mining areas within the Fortymile River drainage by a qualified BLM archaeologist. BLM's policy is to comply with the National Historic Preservation Act and its regulations for Section 106 at 36 CFR 800.

71-5 Historic (i.e., mining) sites do exist in these drainages but are not necessarily appropriate for federal protection unless they can be determined eligible for the NRHP. "Man-made topography in historic mining districts," decayed cabins, ground scatter, and privies may be important archaeological manifestations but they rarely make the NRHP unless part of a significant complex

or district. Nothing found on any mining operations in the Fortymile River drainage has come close.

71-6 BLM chose to analyze various water quality performance standards in its alternatives, even though authority and responsibility for these standards are beyond BLM's control. EPA variances were analyzed under the Proposed Action because variances were a component of the water quality standards in effect during the 1987 mining season, and may continue to be a part of future standards. Further discussion of EPA variances has been included in the final EIS.

71-7 Sections 3.4 and 4.4 have been revised.

71-8 See revisions to Section 3.5.

71-9 The analysis covers the entire Fortymile River drainage, the Mosquito Fork, and all values associated with this Wild and Scenic River System.

71-10 Clarification added. Refer to Area Map in Chapter One for a clear depiction of the study area.

71-11 See revisions to all maps of the Fortymile River drainage.

71-12 Figure 2-7 (now Figure 2-6) and related text have been revised.

71-13 It is clearly stated throughout the EIS that cumulative impacts are a function of past, present and future impacts, with past and present impacts treated in Chapter Three and future impacts treated in Chapter Four. See additions to Chapter Four, "Special Considerations" for each resource, which discusses the total cumulative impacts.

71-14 This EIS primarily address the management of placer mining activities and it is in this context that there are no significant impacts on mineral resource availability for development. Figure B-1, Summary of Worst-Case Scenario, was revised to reflect the reduction of gold resources due to high levels of mining activity.

71-15 Periodic disturbance and habitat loss due to road and trail use is analyzed in Section 4.6.

71-16 Text has been revised and corrected.

71-17 See text revisions to the beginning of Chapter Four, Appendix B-1, and the Worst-Case assumptions.

71-18 Section 4.1.6 has been revised.

71-19 BLM will require that performance standards are met and will not prescribe a specific type of mining method.

71-20 Error corrected.

71-21 The final EIS contains an index, which directs readers to the appropriate pages for the ANILCA 810 analysis.

71-22 See Section 4.6 for cumulative impact and habitat loss assumptions for the next ten years.

71-23 See Section 3.7 for cumulative fisheries analysis and Section 3.9 for subsistence use of fish. State of Alaska has regulatory authority and responsibility to adjust harvest levels so that stocks are not significantly reduced.

INVIRONMENTAL IMPACT STATEMENT
BY
Daniel D. Draper 40 Mile Mining District
RE: Fourty Mile River Placer Mining
Draft Cumulative

1 Purpose and Need...

It seems very useless to try to understand the method and reason for this issue since the Federal code of regulationd manual "Surface Management Regulations (43 CFR 3809) states the federal laws as they exist and everyone applying for a federal license must comply with these regulations. The alternatives in the draft cumulative are in direct contrastto the regulations as stated.Terry Maley's Book on Mining law states the the 1872 mining act is still the mining law by which we the miners are bound by and that is one of our constitutional rights which we have no intentions to give up to uncontrolable beauro-cagies.

2 Descriptions and Alternatives...

This mine here is located on the outmost extremeties of the 40 Mile mining district and since the main issue in this proposal seems to refer to the clean water act it would be almost impossible for any miner to corupt the 40 mile from this distance which makes an unfair practice to force us to live under laws which have no impact on the g general mining laws which this Draft. We have no objections to complying whith the laws as they are written, but why should the government try to force new laws which are absolutely impractiaal and some impossible?

3 Affected Envirooment...

This being one of the most expansive studies in the draft, it calls for a complete look at the over all picture of what the mining industry really means to America and the men and women which have been responsible for added industries in Alaska such as Tourism and sports. In all fairness lets look at the scene in the early 70s when the Grayling in Cherry Creek could only be found wbth one fish in one hole and it was only around 6 inches long. also it was only about 3 inches in diameter and at that time the miners were allowed to mine directly in the creeks, the fish began to grow and multiply to the extent that today the fish in this same creek can be caught by the dozens in the same place and are increasing each year. The food deposited in the streams are an asset to the fish sportsman.

Being a member of the Paxson Fish and Game advisory board, I have noticed that because of the influx of mining activities, the bear hav e moved farther inland which has been responsible for the increase of t the moose and caribou population in the 40 mile mining district, this has resulted in a greater increase in the hunting herds of this area. The effect of the mining has not been of any harm to these animals which means that the miners have been an asset to the hunting industry.

It is a well established fact that the miners who mined with the d dredges back in the 20s and 30s knew that disturbing the vegatation would destroy the ice and permafrost along the Walkers River watershed and now 50 years later it can be seen that where there was only tundra, Niggerheads, and buck brush, there is now a good growth of Birch, Alders, and willows which furnish food for the animals. There are side hill f flumes half way up the mountains which were dug 50 years ago and today theses flumes are surrounded by Spruce trees which are over 2 feet in diameter, all around the outside of the flume trees are nothing but scrub brush and ice covered hills where no large vegatation can grow.

In regards to mineral resources, this countary has been recognized as one of the better scources for minerals in the state of Alaska and should be respected for this pourpose along with all of its other attributes. There is no reason in the world that any one reasource should have preferencial treatment over the other since there is enough here for everyone and the public should learn to get along with each other. No American citizen should be denied his right of Life, Liberty, and the persuit of Happiness.

Recreational/Visual Resources... This is a subject that deserves to be recognized by the people who travel these roads in the 40 Mile Country, because if it were not for the miners of old as well as the miners of the present day, there would be no roads for the Tourist industry to travel on. This land would remain as desolate as the most desolate land in some parts of interior Alaska and would be totally unassesable to only those who have enough money to fly into such remote areas. The miners have contributed excessably to the Tourism Industry and this has been done at their own expense. This road which we built back in the early 70s took 4 years to build 3 miles of road and today it has been names as a public acsess in the Draft Cumulative.

4 Environmental Consequences...

This portion of the draft is one of the most redicouls statements that is printed in the book..... There is no way that anyone can project a circumstanc whic has not happened yet. There are many miners who have chosen to remain in a dormant status until the law suit with BLM is completed. These same miners intend to continue at a later date and i in the meantime there will be more young people becomming interested in the industry so there is no way that any given number of miners can be projected.

5 Public Participation...

This portion of the draft should be aknowledged by every intereste d person, just to see the interested dignatarys involved in this decision making document. Now as a matter of comment, I suggest that instead of giving the 40 Mile Miners a choice as to which of these proposals that we want to live with, let us look at the facts as they stand, the Laws have been written already, they have proven themselves as adaquate and they are still the supreme laws of the land. These laws we have recognized and are willing to live with so therefore, I suggest that those who wrote this draft go back to the drawing board and write a new draft that the miners can live with because the mining industry is a long term, high cost investment where the Tourist industry is mostly a one time per person, once in a lifetime experience and will continue to thrive,Hunting and fishing in the area are time limited industries and the proof has been established that the Mining industry has has n o real ill effects on any of these other economies..

Daniel D. Draper

David D. Draper

Aug-12-85

To. B.L.M.

After reading the 40 mile river E.I.S. it seems apparent, that other then visual, placer mining has little effect on the environment. Maby your final E.I.S. will explain why then the placer miners are be hasseld out of business.

Please forward the final draft to me at P.O Box 5723 Ketchikan Alaska 99901

Thank You

Tom Weston

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Northern Alaska Environmental Center

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FAIRBANKS, ALASKA 99701
(907) 452-5021

August 10, 1988

Richard Dworsky
Bureau of Land Management
701 "C" Street, Box 13
Anchorge, Alaska 99513

Dear Mr. Dworsky:

The following are the comments of the Northern Alaska Environmental Center (NAEC) and Trustees for Alaska (TfA) on the Draft Cumulative Environmental Impact Statement (DEIS) for the Fortymile River drainage, a component of the National Wild and Scenic Rivers System.

Many of our comments are basically the same as those we submitted on the Beaver Creek and Birch Creek DEISs, since the documents are nearly identical in many aspects. Once again, we object to the Proposed Action because it is obvious that it will not result in compliance with all necessary state and federal laws, regulations and provisions of the Fortymile River Wild and Scenic River Plan. The DEIS includes many statements (a large number of which are identical to those in the two previous DEISs so I will not reprint them in this letter) indicating that the resources of the Fortymile River drainage would receive a much greater degree of protection under Alternative C than under the Proposed Action. Designation of the Fortymile River as a component of the National Wild and Scenic Rivers System mandates that it receive the maximum protection possible while mining occurs.

The NAEC and TfA urge the BLM to adopt Alternative C in its final decision in this EIS process. Alternative C can best meet BLM's legal requirements and can best comply with the management goals and policies outlined in the Fortymile Wild and Scenic River Management Plan. This alternative can also best meet BLM's mandatory obligation to ensure compliance with Environmental Protection Agency (EPA) and Army Corps of Engineers regulations. Compliance with the provisions of the river management plan and other state and federal agency regulations is a mandatory obligation of the BLM which cannot be considered optional.

Analysis of the Alternatives

Once again, we object to the manner in which the DEIS downplays the benefits which can be obtained through use of better water quality treatment and reclamation practices defined in Alternative C as compared to the Proposed Action. The analysis provided in the DEIS is inadequate to justify the conclusions that the environmental consequences of these two alternatives would differ very little. In fact much of the data in the DEIS indicates major improvements in environmental protection would occur under Alternative

(page 1)

C.

Many of the final conclusions regarding the environmental consequences of the various alternatives are directly contradicted by data within the EIS. As an example, the Affected Environment section of the DEIS includes information taken from the Alaska Department of Fish and Game (ADF&G) and other sources which indicates that recovery of mined areas will occur at a much faster rate if the fine materials in the overburden, which is stripped before reaching pay gravels and collected in settling ponds, is respread over the tailings after mining is completed.

The DEIS states, "Succession in placer mine tails depends very heavily on the percentage of fine-grained materials or "fines" in the substrate." Under the Proposed Action BLM will not require the fines from settling ponds, the main source of such fine materials in areas which have previously been stripped of overburden, to be respread over tailings in the reclamation process. In evaluating the Proposed Action's environmental consequences with regard to soil structure, the DEIS states "Locations devoid of fine material would develop soil structure extremely slowly, if at all, with little or no vegetation being established."

The environmental consequences analysis of Alternative C which requires respreading of fine materials from ponds over tailings states "This alternative would essentially provide for restoration of the disturbed area...revegetation would probably speed up the process of surface stabilization and reduce the rate of erosion from the disturbed area." In examining the irreversible and irretrievable committment of soil resources which would occur under the various alternatives, BLM summarily dismisses the benefits to be gained through sound reclamation practices by stating, "There would be no significant irreversible and irretrievable committment of soil resources under the Proposed Action and Alternatives A,B, and C since productive soil stability will eventually develop after 50 years if reclamation practices are followed." This analysis fails to recognize that even under BLM's estimates the time frame involved in site recovery is twice as long for the Proposed Action (50 years) as compared to Alternative C (25-30 years). In addition, BLM's prediction that a site will recover in 50 years without respreading of fines is not scientifically substantiated. There are many sites in interior Alaska which were mined over 50 years ago and show almost no soil and vegetation recovery at the present time. **74-1**

This type of faulty, unsubstantiated analysis is found throughout the EIS and severely undercuts the credibility of the entire document. Also, it is not clear why none of the alternatives includes the reclamation practices identified in Appendix D-2 on page A-17 which would result in replacing habitat in 5-25 years instead of the Proposed Action's 50 year time frame. This approach, which is buried in an appendix, is essentially hidden from the public and not readily available for comment. This approach to reclamation should have been included in one of the alternatives in order to provide a full range of options for the public to evaluate and comment on.

Enforcement

74-2 None of the alternatives give any explanation of what kind of enforcement measures will be used to ensure compliance with regulations. Enforcement measuremust must be defined if the public is to have any confidence in their implementation. In addition, it must be clear that any operators who are issued a notice of non-compliance which is not immediatly corrected will be required to post a bond equal to the cost of reclamation before being allowed to operate the following year.

Sediment Loading

74-3 Once again, the information provided in the DEIS pertaining to sediment loads caused from natural runoff and mining activities does not reflect the most recent data derived in studies on Alaska ecosystems. Please refer to our comments on the Beaver Creek DEIS for a more detailed explanation of our views on this matter. The newer data based on studies in Alaska should be incorporated in the final EIS.

Water Quality

74-4 As in the previous DEISs, the Fortymile DEIS is extremely deficient in its explanation of water quality standards and regulations and the responsibilities of the Environmental Protection Agency (EPA) and the Alaska Department of Environmental Conservation (ADEC) with regard to water quality protection. The DEIS does not explain the difference between end-of-pipe effluent limitations and state in-stream standards or how and when mixing zones or EPA variances can be applied.

The BLM has two major responsibilities with regard to water quality, both of which must be met. The first is to ensure compliance with all state and federal water quality permits and regulations. The second is to ensure that the waters of the Fortymile National Wild and Scenic River are not degraded. In order to fulfill these two mandates different treatment standards may need to be applied depending on the number of mines proposing to operate in the drainage in a given year. With few mines operating the higher level of sediment discharge allowed with the use of EPA variances may not adveresly affect the aquatic system. With a greater number of mines operating it may be necessary to restrict sediment discharge to the standard EPA effluent limitation of 5 NTU. With a large number of mines in operation the 5 NTU increase above background allowed each mine could result in cumulative adverse effects to the aquatic system.

The Proposed Action will not result in full compliance with state and federal water quality standards nor will it prevent degradation of the waters of the Fortymile National Wild and Scenic River which is required by the River Management Plan. While the description of the Proposed Action indicates that the performance standards would be "the current EPA effluent guidelines and ADEC water quality standards or the existing ADEC/EPA variance..." the Action Scenario states that "the remaining operations (those that do not choose to employ zero discharge, tailings filtration or use chemical flocculation) would probably receive EPA variances from the water quality standards and would treat mine effluent entirely through a

simple settling process."

Page 4-12 of the DEIS states that "under the Proposed Action water quality would probably be worse than the conditions that existed during the 1987 mining season..." and "the turbidity standard would not be achieved due to variances...". Thus, by BLM's own acknowledgement it is evident that the Proposed Action will not result in compliance with turbidity standards.

The NAEC endorses Alternative C as the only option which can provide adequate protection to the Fortymile River system, given the number of mines projected to operate in the basin. Even if all 37 or so mines in the basin achieved compliance with state water quality standards, the 5 NTU increase above background allowed each mine could result in the mainstem of the Fortymile River flowing at 185 NTU, a level which would definately cause adverse affects to the aquatic system. Incorporation of EPA variances would exacerbate the situation by allowing increased sediment loads. Zero discharge or its equivelent is necessary to protect the aquatic resources of the Fortymile River with a large number of mines in operation. If only a few mines (on the order of 3-5) proposed to operate in the Fortymile basin in a given year the cumulative effects of the 5 NTU increment allowed each mine may not adveresly affect the system and state water quality standards may be adequate. Since the DEIS fails to project what sediment loads the Fortymile system can handle without suffering major adverse effects or compromising its values, it is impossible to judge what number of mines could operate under state water quality standards without causing cumulative adverse effects to the basin. Without this data "zero discharge" is the only reliable alternative which can protect the values of the Fortymile River.

The DEIS does not adequately address cumulative impacts to chemical water quality. This is a serious deficiency which must be re-examined before the EIS can be considered complete.

In the DEIS where an attempt is made to project the number of mines which may be operating in the drainage, the BLM establishes a one to one corrospondance between the price of gold and an increase in the number of mines likely to occur. Later, where estimations are made concerning the reduction in the number of mines likely to occur with increased costs in water treatment, there is no incorporation of what increased prices of gold would do to lessen the impact of the higher water treatment costs. The final EIS should examine how many mines which may have chosen to cease operations in 1988 based on water treatment costs, would choose to resume operations when the price of gold increases.

Reclamation/Wildlife and Fisheries Habitat

The NAEC endorses the reclamation practices defined by Alternative C. This is the only alternative which provides for safe fish passage, removal of barriers to fish migration upon completion of mining, rehabilitation of fish habitat and maximum recovery of the vegetation and wildlife habitat of the mined site.

74 Continued

In the case of previously mined areas where there is no overburden remaining to provide fine materials to be mixed in with coarser tailings, it is crucial that fines collected in settling ponds be respread during reclamation. This is the only mechanism available to ensure recovery of soil and vegetation in previously mined areas. In areas which are being stripped for the first time it may be adequate to respread overburden and organic material in reclamation in order to encourage development of soil structure and vegetation. This can only be determined on a site specific basis in the Environmental Assessment of an individual mine's Plan of Operations. Alternative C is the only option which can provide the level of reclamation needed throughout the entire basin as a matter of standard policy to be adopted in the final EIS.

74-5 Page 2-7 of the DEIS states that, under the Proposed Action, "the stream bypass [will be] stabilized or reinforced to make it the permanent stream channel." Page 2-17 goes on to state "Streams that are blocked to fish passage would also be unavailable as habitat to some fish populations in the affected area." According to ADF&G regulations safe fish passage must be provided through mining operations for both anadromous and resident species of fish.

The DEIS is very deficient in its assessment of potential impacts to caribou habitat and populations. While the DEIS indicates that the ADF&G population goal for the Fortymile Caribou Herd is 50,000 animals and the current population is well under that, little is said or done to support the goal. While the DEIS acknowledges the importance of upland riparian habitat to moose it fails to provide for swift and complete rehabilitation of that habitat. The ADF&G has gone so far as to utilize wolf control in the Fortymile area in an attempt to raise the moose population to the desired level. In a National Wild and Scenic River corridor it is not acceptable to implement predator control to increase big game populations while simultaneously allowing critical game habitat to be destroyed by inadequate reclamation.

The DEIS indicates that "the long-term productivity of wildlife habitat subject to mineral development activities would depend on...the successful reclamation of habitat that has been physically altered, removed or lost." Given the importance of thorough reclamation to wildlife habitat and populations, it is essential that BLM adopt the reclamation practices of Alternative C.

<u>Threatened and Endangered Animals</u>

The Fortymile River provides important habitat to a significant population of nesting peregrine falcons. Page 3-39 of the DEIS states that "evidence from monitoring in 1982 suggests that human activity, noise from boat traffic, and suction dredges in proximity to a peregrine falcon nest may have contributed to nesting failure." The BLM must prevent adverse impacts to threatened or endangered species and must control human activity and/or noise disturbances, including that caused by suction dredgers, whether on state or federal lands, in order to do so. We support the "Additional Protection Measures" for peregrine falcons identified on pages 4-41 and 4-42

of the DEIS.

Subsistence

The DEIS indicates that there is little subsistence use of the Fortymile Caribou Herd but that utilization would probably increase if the ADF&G population goal of 50,000 animals in the herd was met. The same situation applies to moose. This points to the need for incorporation of the best habitat and reclamation measures possible.

Recreation

Recreational river floating is one of the primary purposes and values for which Congress designated the Fortymile River as a component of the National Wild and Scenic Rivers System. As such, recreational uses which are consistent with this designation should receive protection as a priority over mining and other uses which may be incompatible, depending on how they are conducted. Page 4-61 of the DEIS states that under the Proposed Action "the overall impact on the recreation values could result in further degradation relative to recreation management objectives." This proposal is not satisfactory and must be improved in the final EIS.

The DEIS is completely deficient in its examination and treatment of the entire issue of suction dredging and long-term camping in the Fortymile basin. Appendix C-2 which provides a history of the long-term camping program is inadequate to allow the public to make informed comment on the issue. Even worse, the proposed management of long-term camping if the EIS is approved is described in an Environmental Assessment which readers of the EIS do not necessarily possess. This is such a blatent ommission of information and examination of impacts that a supplement to the DEIS should be issued on the topic.

Page 3-57 of the DEIS states "...recreational river floating in the area has declined since 1978, when increased prices for gold and the popularization of the suction dredge led to increased mining activity and a decline in the primitive setting...". We do not believe that intense use of motorized suction dredges with excessive noise levels and semi-permanent camps is an appropriate use in the Fortymile Wild and Scenic River Corridor. At best, such use can only be tolerated under the strictest regulations designed to protect natural resource and esthetic qualities of the river.

As is indicated in our comments above under "Threatened and Endangered Animals" the BLM is already aware that suction dredge camps and excessive noise levels created by dredge operations is very likely, if not definately, impacting peregrine falcon nesting success. The number of dredging operations combined with the fairly high density of known peregrine nesting sites makes conflicts essentially impossible to avoid. The supplement to this DEIS on long-term camping and suction dredging or the final EIS must examine this issue in detail. The BLM has the responsibility and authority to manage the Wild and Scenic River Corridor, irregardless of State ownership of navigable portions of the riverbed, and must exercise it.

If continued suction dredging is to be allowed it should occur only under the following provisions, as a minimum.

1) All aspects of the river management plan involving long-term camping and suction dredging must be adhered to, including: A) a dredge intake of five inches in diameter or less, and; B) noise limited to the "A weighted sound level of 80 dB at a distance of 30 feet."

2) The river is divided into specific zones where suction dredging is allowed or not allowed based on criteria such as: A) proximity to peregrine falcon nesting areas (in conformance with the peregrine falcon recovery plan no dredging should be allowed within two miles of nesting sites); B) availability of access, such as by river, which will not degrade the primitive character of the river, and; C) how many dredge operations a particular section of the river can handle without adversely impacting critical wildlife or fisheries habitat or causing excessive impact to the solitude of river floaters.

These criteria are essentially an expanded version of the "Additional Mitigation Measures" for protection of peregrine falcons delineated on page 4-41 and 4-42 of the DEIS which we strongly support. More detailed criteria should be developed in a supplement to the present DEIS and made available for public review and comment.

<u>Conclusions</u>

The NAEC and TfA feels that Alternative C is the only realistic option provided in the DEIS to protect the resource values of the Fortymile National Wild and Scenic River in the face of on-going mining. We hope that these comments will help the Bureau in a determination that Alternative C is really the only viable alternative, and thus, should be adopted as the Proposed Action in the final EIS.

Sincerely,

Randy R. Rogers   Patti J. Saunders

Randy R. Rogers,
NAEC

Patti Saunders,
TfA

74-1 The "irreversible and irretrievable" section discusses the commitment of resources which will not be returned to the area for a very long period of time, if ever. The reestablishment of productive soil materials within 50 years does not meet that criteria.

Many of the sites which are nearly barren from historic mining are on dredged tailings, which sorts out the fines. The analysis outlined in the EIS is based on the prevalent mining method in the Fortymile watershed, wash plant operations. The historic dredge tailings are considered under item 3 of Appendix D-1, which estimates 85% barren after the 50 years of regrowth.

74-2 See Section 2.3.1 for information on enforcement, noncompliance, and bonding.

74-3 See discussion at beginning of Section 4.4.

We believe that our worst-case analysis supplants the need to expend exorbitant amounts of time and energy gathering a massive database which could possibly identify the total sediment load of the Beaver Creek drainage. Furthermore, we believe that these data would not bring us any closer to solving the sediment problems in the watershed than just sound management could under the 43 CFR 3809 regulations identified in the Proposed Action.

74-4 The final EIS clarifies roles and responsibilities of the State and EPA on water quality. Explanation of an EPA variance is in the final EIS.

74-5 Statement has been revised.

Michael Busby
Kachemak Mining
47460 Falls Cr Dr
Homer, AK 99603

BLM
Attention: Richard Dworsky
Re: Fortymile River Draft EIS

EIS Team members:

I am, and have been for 9 years, a placer miner on Willow Creek dba Kachemak Mining Corp. I am current president of Fortymile Miners Association.

The draft EIS has some short comings, primarily due to statistical inaccuracies or lack of good data which I believe in the long range will be used against the mining industry by the BLM and Corp of Engs. Although the "proposed action" is obviously the best choice offered, it is too stringent and rigid. There needs to be room for variances due to different circumstances that have not been addressed in this report (for some examples, refer to my oral testimony given at Chicken)

One of the concerns voiced by miners at our last meeting was that numbers

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One of the concerns voiced by miners at our last meeting was that numbers

used in the consequences of each action might be interpreted wrong. A statement should appear in the final EIS that these numbers are only hypothetical and in no way will limit mining to any numbers.

Some of the statistics that your report are based on should be re-examined:

(1) Cost of reclamation: These costs probably vary a lot, but from my own experience, $1000/acre is too small a figure.

(2) Cost of 100% recycle. Again from experience, the numbers presented are too small. Last year it cost us about 25% of our gross just in lost production time. 75-1

(3) Disturbance and "disruption" (what is this?) statistics are either wrong or very misleading. I don't believe 30 miners "disrupted" 178,000 acres (or whatever your number is) in '87.

(4) If you were to measure "trails", you would find most are about 12' wide (not 30'). Why does use of a trail disrupt wild life 1/2 mile either side and camp occupation only disrupts wildlife in a 500' radius? 75-2

(4) Length of revegetation - Too long!
(5) Aquatic effects. Lack of documentation.
(6) Erosion - why such a difference between active and abandoned mines?
And so on!

Visual impact is an impact that has various effects on different people. By far the numbers of yearly tourists in the Fortymile never leave the Taylor Hwy. One frequently asked questions is where can we see an active gold mine? How much impact are we having if they have to ask?

Of the actions mentions in the draft EIS, I think the proposed is the best, but it should include adequate variances to meet different situations. Some thought as to relamation variances is due. Because of uncontrolable natural events, reclamation can lead to increased erosion (I mentioned glaciation and its effects in my oral testimony) Attempts at rechanneling the creek could lead to inevitable erosion of "stabilized"

settling ponds. Water quality should also be allowed variances where appropriate. 100% ~~recycle~~ recycle (no discharge) is next to impossible in almost all mining situations. Water gain is unavoidable. Water quality can be adequately maximized with settling ponds and some recycling.

In closing, I would like to stress that BLM policy must address all land uses as in the past. BLM must not make policy just to appease one special interest group (which rarely speaks in the best interest of Planet Earth)!

Sincerely,
Michael Busby

JUN 15 1 22 PM '88
BLM AK SO 974A

75-1 The estimated reclamation and water treatment costs are just estimates and were taken from the best available sources. Without better cost information, the estimates will continue to be used.

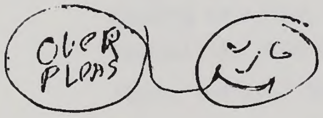
75-2 The figures used to calculate potential areas subject to disturbance/disruption are intended to serve as a basis of comparison between the alternatives within this analysis as well as a basis for comparison between this and other studies of this type.

Dear:
Michael J Penfold
Richard Dworshy, Project manager
BLm.

I live in The Forty mile Drainage, Have For 9 years, I conser my self as part of The enpiroment. I have mine in The Forty mile River, my coments on The quality of The water, is That The minning both Suchition And Cat minning Does not hurt The quailty of The water, When The rains come For days at a Time The rive Turns red From Them. IT is worse Than any minning could do, Most of The mud comes From The River clifs That errodes. If There is To Be Regulations For water quality Then This should be Brough into consideration.

Your over All Plans in your E.I.S. are pretty much on Target Excempt your alternat plans ~~wish~~ which I Feel you dont need To Have in your report, You Should use plan 1 And dont Let Others run your busness.

The minner are out There Busting Balls Too make a Living The dont have a Steady income From Some Organasitions, To Support Them, There out here Just Like The men before Them That Helped make This country what IT is To Day I hope Know on Forgets This.



Sincerly
Wayne MacMurray
Box 54
Chicken, Alaska 99732

P.S. I have Two Son Who need to chance To mine ~~Two~~ Too. The NEXT generation

76 Continued

The following is the written testimony of John L. Turner owner of three (3) federal bench claims located on the left bank of the main stem of the 40-mile river. Said claims are known as Discovery & #'s 1 & 2 Below Discovery; also known as M.S. 2400 ALASKA.

Mr. Vern T. Still and myself, both of Fairbanks, Alaska, have been involved in the 40 mile claims described above since purchasing them from Mr. W.W. Warrick in 1975. Mr. Warrick had been there continously since 1953. Mr. Warrick was preceded by Mr. Watson who had been there for many many years. Unfortunately in our title search, conducted prior to application for survey in 1977, some of the old 40-mile District records had been destroyed by fire prior to transfer into the Fairbanks District some years ago. My point is that these claims have been occupied continuously for over 100 years. Many of the same fire hardened logs hace been used to re-construct a new cabin when the old finally gave out. As is evidenced by the ditches, the claims were worked by hand, assisted by the use of upland water for hydraulicking. There is also considerable evidence of drifting here and there on the upper reaches of the bench. Cribbing is still stacked here and there. We first mined the 40-mile claim in 1976, with the aid of two cats. We sluiced approximately 15,000 bedrock feet & performed more exploratory work on the other claims. As a result of our findings we initiated our mineral survey in 1978. In 1979 we sluiced approximately 10,000 bed-rock feet on the downstream side of a large limestone reef in order to allay concerns as to the nature of the ground. Being satisfied with the results we paid about $15,000, as we could, finally completing our mineral survey in 1983.

It is and obviously has been our intention to proceed to patent on these claims. The appearance of the "Draft River Management Plan", May 11th 1983 plus the confusion surrounding the "Clean Water Act" for a period of time, the 43 CFR-3809 Regulations (surface reclamation etc.) and more recently the Wetlands Permit have all made us somewhat cautious in proceeding to patent until the dust settles. As you know, our economic feasebility plan has to take into consideration each and every one of the above "changes" to mining as we once knew it. The cost of extracting an

ounce of gold has gone up since 1976, but now that we know about what our added costs might be with more understanding of what these new laws require of us we can go on to patent. Gold is also four times what it was in the fall of 1976. This brings us to my major concern as to the Environmental Impact Statement issued by the B.L.M. Alaska State Office (BLM-AK-ES-88-012-3809-918) on the Fortymile River Placer Mining.

As generally stated in my public testimony, which I understand was recorded for the record in Chicken, Alaska on August 3rd, 1988, by the BLM: I am quite concerned that the "Proposed Action", found inclusively on pages S-3,4 & 5 of the E.I.S., confine itself to the issuance of 37 permits for 10 years. I am somewhat convinced that mining, as it existed during the season of 1987, is not a true picture of mining as it will be in the future in the 40 mile watershed. As stated in my opening paragraph, there has been a great deal of confusion on the part of many of us, with all the changes placer mining has undergone in recent years. Adding to the number, is the certainty that many more people would have recreationally dredged the river bottom, had permits been more available. As the confusion becomes clear and we miners know what we have to do to be in compliance with the law then, as you have surely observed, we begin to get innovative and get back to ore extraction.

77-1

As page A-7 of the E.I.S. indicates there are,"Roughly 865 claims in the Fortymile River drainage." There are over 800 valid state claims in the Fortymile and that brings us to well over 1600 active claims. As the entire E.I.S. is predicated on the existence of some 37 miners, (20 state and 17 federal) or less if one ventures into the totally unacceptable "Alternatives". What is going to happen if 200 miners (including dredge permitee's) apply for ming licenses in 1990? By law we 200 could all receive permits if we were in compliance with the law. Even though we all complied with Clean Water regs, Surface regs, COE regs, what I fear is that we will all be back in court at the mercy of a small group who are objecting to the issuance of more than 37 permits. How long might that tie us up as the BLM etc. conducts a new study which will again simply allow us to exercise our rights under the present mining laws of 1872 (as amended). In my opinion, we miners are opposed by certain individuals who under the guide of environmentalism would cease all mining activity in the 40 mile region by total preservation. I don't want to see this limiting factor in the

77 Continued

proposal or any proposal as I fear it limits our rights as future miners and citizens of the United States of America.

In conclusion: I thank the BLM for sending people to Chicken on August 3rd, 1988, to hear or see some 50 or 60 of us state our concerns. I also thank you for your patience from 7:00 p.m. to almost 12:00 a.m. and for "hanging around" afterwards to listen to us. Now: I do not thank the agency for its failure to forward a copy of the E.I.S. to either myself or Mr. Still. I was informed by a fellow miner and picked up my copy at Ft. Wainwright several days before the Chicken meeting. I confess that I am chagrined at the fact that we miners, who have got to meet all sorts of recent water and surface laws which are specifially designed to protect and/or restore the environment now face this E.I.S. The federal court has directed the BLM to 1. Identify the environmental harm 2.&3. Identify to what extent harm, or some of harm, can be prevented and the expense, 4. Identify the economic and social benefits and costs of the matter being evaluated, 5. Assess cumulative environmental impacts of water quality and subsistence. My query is this: Why did the BLM prepare a formal E.I.S. at a cost of $700,000 to date to the American tax payer, ultimatly costing a total of $1,100,000 when in final form. Wouldn't it be more practical and realistic to prepare a study for the court as it is affected by present day law and the accompanying regulations. Why has the BLM involved itself in a study in which the "proposal" is really the only legal suggestion one can talk about under present day law.

It would seem to me that the only relative and perhaps legal suggestion in the E.I.S. is that portion contained in the proposal, except that it is highly limited in scope as to future potential mining in the 40-mile watershed. I believe any of the alternatives would conflict with existing water and/or surface laws as well as the 1872 mining law as amended. At least 23% of the Wild and Scenic corridor is situated on navigatable state owned river bottom and this claimed area as well as other state owned claims are not under direct BLM supervision as are the federal bench claims. This further confuses the issue. I believe and would hope that the court is simply asking for a study from the BLM that would fairly evaluate the cumlative effect that mining, as allowed by all existing law, would effect the environment and the relative cost of enforcement of those existing laws. I especially believe that to be true to those of us that pro-

ceed ANILCA. I quote from the Draft River Management Plan-Fortymile River dated May 11th, 1983 as published by the BLM. Page 42 - of the ten listed management objectives "#10 To protect valid existing rights and future rights granted pursuant to appropriate federal and state laws." On page 3 of this draft it indicates that an E.I.S. for the proposed Fortymile National Wild & Scenic River was approved by the Dept. of the Interior in 1973 and that this River Management Plan "will not result in any significant impacts beyond those addressed in the E.I.S." Also on page 3 "In addition, this plan has been developed with section 810 of ANILCA so that the management policies will cause the least possible adverse impact to the local residents who depend upon the river corridor for subsistence needs." The final River Management Plan was adapted in December of 1983 and contains these same provisions. I suggest that the BLM submit an environmental study on its own E.I.S. of 1973 and its River Management Plan of 1983 as modified by the Clean Water Act, Wetlands Requirements, 43 CFR 3809 Regulations, and all other present day law that has modified mining to prevent environmental degradation. If you don't stick with what Congress has mandated you to do and the court directed you to do then you, the BLM, are going to cause more litigation. We, more and more of us, miners can live and operate with the laws and resultant regulations mandated by the Congress of the United States. Don't even suggest that you now allow us such things as "a limited number of mining permits" as you do in the proposal or "no water variances" as you do in the least restrictive of 4 alternatives culmunating in "No Mining". I don't see how all of this is relevant to present dau law, which the court is sworn to up-hold. If I am confused in my understanding of how the American Governmental System works, surely neither of us can be confused as to the obvious intent and deep concern of all those miners huddled in 1 dimly lit room in Chicken, Alaska on August 3rd, 1988. Some of us came from hundreds of miles or twenty-five miles similar to a hundred or more road miles. You heard recreational dredgers wanting to dredge, old and you bench-miners all basically expressing our hurt and bewilderment. You heard our resentful voices indicating that we were given "clean water" instead of the old way and that we were reclaiming and obtaining wet lands permits from yet another regulatory agency so that now we deal directly with the BLM, EPA, COE, DNR, DEC, IRS, dept. of Revenue. Violations of some of the above regulations can get us a fine of $25,000 per day. You heard testimony from people indicating the great delight the vast majority of tourists and other visitors find in looking at old and present

77 Continued

day mining operations. Not only on the Taylor Highway but on the streams they float down. You were personally invited to visit several claims so the miners could show you mined areas that vegetate much more rapidly and completely than your 1988 E.I.S. indicates. Several of you BLM people directly involved in the preparation of the E.I.S. admitted to never having been on any or very little of the river corridor involved. The latter may be fine but only if you stick to your 1973 E.I.S.m and your December, 1983 River Management Plan, as modified by existing law (when applicable).
Let us mine, under the law, as is mandated to the BLM by the congress in keeping with multiple use of designated federal land.

I fear that this E.I.S. will lead to some sort of compromise being sought by the plantiffs in the law-suit. Any compromise would violate tha rights of valid existing miners and would spread the same shadow on state claim operators. I believe this to be an overt attempt to severly limit the present and future rights of all present and potential miners, be they serious or recreational, in the 40-mile Region and to include both suction dredging and bench mining. Suction Dredging is a great recreational and/or more serious form of mining observed on many of the streams in California, Oregon, etc. Why remove the one most accessible and historically productive gold mining system in the state of Alaska, trifle with valid existing rights of American citizens, and probably deprive the majority of incoming visitors with what they came to Dawson and the 40-mile to see in the 1st place. Allow us to mine with the foresight that congress has recently imposed and let all of us, as American citizens, enjoy the bounty of the 40-mile. Mining, small or large as the case may be, is still a great American dream to some of us. You threaten not only the largest of miners but also the people who just want to set up a little suction dredge for a couple of days. The entire E.I.S. of 1988 smacks of preservationism in the form of both a limited number of permits, and the time factor right down to no mining at all. Preserving is not the manner in which the law addresses environmental concern on lands designated for mining as is the issue at point. I wonder at those that would put so much effort into "preserving" such a vast and wonderful country as that found in our beloved 40-mile country and WHOM those few would be that would so much more enjoy it than those of us that are there now and those countless thousands of us to come, either as workers, visitors, wanderers, miners, floaters, bird watchers. We can all enjoy it folks, and together, at this juncture in our history.

77 Continued

Respectfully Submitted,
August 11, 1988

John L. Turner, broker
Turner Real Estate and Mining

77 Continued

77-1 BLM does not have the authority to limit or set a threshold for mining activity on federal mining claims. The future level of mining activity to be expected under each alternative had to be predicted to conduct a meaningful analysis. These numbers are just prediction; they in no way represent maximum numbers of mining operations to be authorized.

August 15, 1988

Richard Dworsky
Bureau of Land Management
701 C. Street, Box 13
Anchorage, AK. 99513

Dear Mr. Dworsky:

I am writing you today to comment on the B.L.M's proposal for placer mining in the Fortymile River, Beaver Creek, Birch Creek, and Minto Flats areas. I understand that there exist several alternative plans, and I hope you will consider the following points when making the final determination:

1. The final alternative should be designed to comply fully with the purposes and management mandates for the White Mountains National Recreation Area, the Steese National Conservation Area, and the National Wild and Scenic Rivers. As you are aware, these measures have stressed the recreation and conservation value of these areas over their use for mining.

2. Full water reclamation practices and water quality control measures should be a must for any placer mining activity.

3. Alternative C currently may be the best alternative, as it stresses maximum recovery of the mining site and protection of water quality.

4. All water quality control measures should comply completely with state and federal mandates. Other mining operations in the state of Alaska have demonstrated that this degree of compliance is not unrealistic.

5. I understand through my contact with the Sierra Club that unless the B.L.M.'s final action adequately protects the special resource values of the Steese/White Mountains (as in Alternative C), the only other viable alternative is no mining whatsoever.

Sincerely,

diane goeke

John and Diane Goeke
678 Eastgate Drive
Charleston, Illinois 61920

cc: Terry Bruce, D-Illinois

Fortymile River

Appendices

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Appendices

Appendix A-1, Summary of Contractor Reports

1. Alaska Division of Geological and Geophysical Surveys (DGGS)

A cooperative agreement was entered into between the Bureau of Land Management (BLM) and the Alaska Division of Geological and Geophysical Surveys. The agreement provided additional funds and logistical support to DGGS for collection, analysis, and synthesis of stream discharge, water quality, and biologic information during 1987. The agreement called for DGGS to attempt to evaluate the cumulative environmental effects of placer mining in the Birch Creek, Beaver Creek, and Fortymile River drainages. In addition, DGGS would also attempt to assess the cumulative impacts of mining on subsistence activities in the Birch Creek and Minto Flats watersheds.

Two reports were produced by DGGS, "Water quality and discharge data from selected sites in the Fortymile and Tolovana Drainages, Summer 1987," written by Stephen F. Mack, Mary A. Moorman, and Linda Harris, and "Compilation of stream macroinvertebrate data for the Birch Creek, Beaver Creek, Fortymile, and Minto Flats drainages, Alaska," written by Mary A. Maurer. Additional data were supplied to the BLM on computer diskettes for stream discharge in the Tolovana and Fortymile drainages by Steve Mack and John Bauer, the latter from the Alaska Department of Environmental Conservation.

2. Alaska Department of Fish and Game (ADF&G)

The Alaska Department of Fish and Game, Habitat Division was contracted to prepare a report for the BLM on the aquatic habitat for all watersheds addressed in Sierra Club v. Penfold. The contract also called for ADF&G to provide the BLM with extant data on computer disks in the Lotus 123 format regarding hydrogeology, water quality, and geochemistry in the four watersheds of concern.

A report entitled "Aquatic habitat and fisheries for seven drainages affected by placer mining: Chatanika River, Tolovana River, Goldstream Creek, Birch Creek, Fortymile River, Beaver Creek, Minto Flats," was filed with the BLM in December 1987.

3. Hagler, Bailly and Company

Hagler, Bailly and Company of Washington, D.C. was contracted to prepare an analysis of the economic and historical relationship of placer mining in Interior Alaska. The Hagler, Bailly study addressed the history of placer mining in the four watersheds, current status of the industry and its socio-economic impacts, and a projection of levels of future mining activity based on the results of research, synthesis, and interpretations of extant information. Hagler, Bailly, and Company subcontracted substantial portions of the study to L.A. Peterson and Associates of Fairbanks, Alaska. This work was facilitated, administered, and funded by BLM-Washington Office (680).

A report was sent to the BLM in December 1987.

4. Environmental Services, Ltd. (ESL)

Environmental Services, Ltd. provided a "Model Environmental Assessment (EA)" upon which the BLM could base the preparation of EAs for each placer mining operation starting in 1988 as directed by order of the District Court in the Sierra Club lawsuit. A report was submitted to the BLM in December, 1987.

ESL was also contracted to provide BLM with data on wildlife for all four drainages. This report was provided to the BLM in January 1988.

5. Arctic Hydrologic Consultants (AHC)

AHC was contracted by BLM to assess differences in water parameters between mined and unmined areas of Beaver Creek, Birch Creek, Fortymile River, and the drainages into Minto Flats (Chatanika River, Tolovana River, and Goldstream Creek.) AHC was also to provide a comparison of water quality values in mined areas with State and federal water quality regulations, as they apply to receiving water. In addition, AHC was to evaluate the state of the technology available for controlling wastewater quality at placer mining operations.

A report dealing with Birch and Beaver Creeks and the Tolovana River was delivered to the BLM on February 29, 1988.

6. Peter E. K. Shepherd

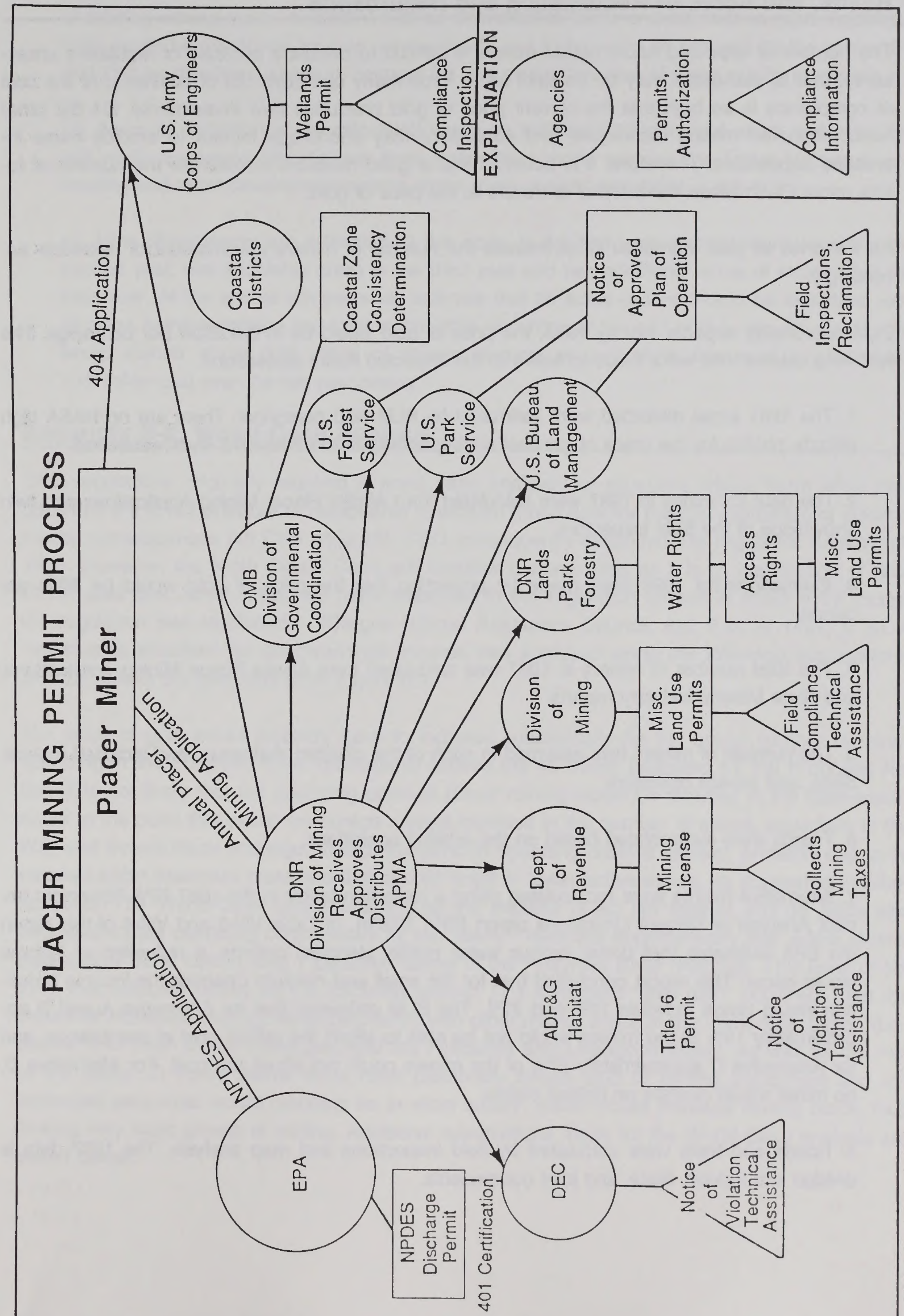
Mr. Shepherd prepared a report entitled "Impacts of Environmental Change on Minto Flats Subsistence Resources." The report examined the effects of placer mining on environmental habitats within the Minto Flats watershed and the relationship of those effects to subsistence uses and needs.

A report was submitted to the BLM in January 1988.

7. Dames and Moore

Dames and Moore was contracted to supply a report assessing the cumulative impacts of placer mining on the aquatic communities of the four watersheds. Additionally, Dames and Moore was to provide an assessment of the impact of placer mining within each stream basin on the aquatic communities of the receiving waters. A report was sent to BLM in February 1988.

Appendix A-2, Placer Mining Permit Process



Appendix B-1, Methodology for Forecasting the Future Number of Mines and Roads, and Acres of Reclamation and Disturbance

The number of expected future placer miners is difficult to calculate because of regulatory uncertainty; that is, standards may be so strict as to force many operators out of business, or the cost of compliance is so high that the current price of gold precludes new investments. On the other hand, improved mining techniques and equipment may encourage miners to employ these increased capabilities. Therefore, it is believed that a good measure to estimate the number of future miners is to relate the number of miners to the price of gold.

As the price of gold increases or decreases the number of miners will increase or decrease accordingly.

BLM reasonably expects that by 1998, the price of gold would be in the $600 per oz. range. The following calculations were made to arrive at the expected future projections.

1. The 1981 acres disturbed were estimated by BLM field personnel. There are no NASA high altitude photos for the areas of greatest mining activity in the Fortymile River watershed.

2. The data for mines in 1987 were calculated from Alaska Placer Mining Applications and field knowledge of the BLM inspectors.

3. Estimations for 1998 were made by projecting that the price of gold would be $600 per ounce.

4. The total number of miners in 1987 was calculated from Alaska Placer Mining Applications, and State Mineral Industry reports.

5. The number of miners was assumed in each of the affected drainages, and included federal, State, and private operators.

6. Trends were extrapolated based on the existing operations.

7. Alternative futures were recalculated using a reduction factor in the 1987 EPA Economic Impact Analysis of Effluent Limitations report (EPA 1987b). In Table VIII-3 and VIII-4 of this report the EPA estimates that under various water quality standard options, a reduction of income would occur. This report concluded that for the small and medium operator the income reduction would range between 13% and 27%. The BLM estimated that for Alternative A and B approximately 13% of the miners would not be able to afford the added cost of compliance, and for Alternative C approximately 27% of the miners could not afford the cost. For Alternative D, no miner would operate on federal claims.

8. Roads and trails were calculated by field inspections and map analysis. The 1987 data is divided into federal, State, and joint components.

9. The projections for 1998 are estimated as follows: Relative to federal claims, current federal roads would exist and would be increased by 40% to account for new mining roads and reuse of existing mining roads. All trails would be converted to roads and counted as such. Additional trails would be developed for new mines. Roads and trails would be reduced by the same 13% and 27% as discussed above to account for less mining because of water quality standards.

10. Acres of disturbance are calculated using an estimated 50-foot road width and a 30-foot trail width. Estimated disturbances from major State roads such as the Taylor highways, and housing and other developments along major rivers are not calculated in this table.

11. Mine disturbances are estimated at five acres in the first year, two additional acres in the second year, two additional areas in the third year and two additional acres of reclamation the third year. At the end of ten years we estimate that 23 acres of land would be disturbed, with 16 acres being reclaimed and total reclamation occurring at the end of the mine life. Each mine would disturb about 0.25 miles of stream channel at any given time and approximately 1.15 miles total over the ten year period.

Appendix B-2, Worst-Case Analysis

CEQ regulations originally required a worst case analysis for situations where there were data gaps and if it is not possible or reasonable to acquire those data for the EIS evaluation of environmental consequences (40 CFR 1502.22). CEQ subsequently rescinded this regulation on May 27, 1986. However, the Ninth Circuit Court still requires a worst case as it is "a codification of prior NEPA case law...(and)...thus, the rules embodied in the regulation remain in effect even though the regulation was rescinded." (Oregon Natural Resources Council, 832 F.2d at 1497, n. 8). A "worst case situation" for environmental impacts was analyzed using the following assumptions, and the results are summarized in Figure B-1.

The value of gold would probably have to increase substantially for the actual number of mines operating in the Fortymile River drainage to exceed the 40 mines projected for the Proposed Action. It is not likely that the operating costs of placer mining would be reduced in the foreseeable future to the point that would encourage a great increase in the number of mines, especially in the Wild and Scenic River drainage. In fact, the trend in operating costs is upward, primarily due to increased water treatment costs and that should result in fewer active mines, as suggested in Alternative C. The Worst-Case scenario analyzed the impacts of 80 (44 federal and 36 State and patented) mines operating continuously for ten years. There are approximately 865 active federal claims, 815 State claims, and 7 patented claims in the Fortymile River drainage. This level of activity was selected based on the following factors: 1) if a modern "gold rush" occurred, then the impact of increased mining would be shared with other mining areas in the immediate region (i.e., Beaver and Birch Creek drainages, and the Fairbanks and Livengood areas), as well as the rest of the State, 2) many claims have been previously mined, and 3) mining equipment and experienced personnel would probably be in short supply, which would increase mining costs, thus limiting very rapid growth of mining. Additional assumptions made for the Worst-Case analysis are stated below:

Components	Worst Case Scenario
Number of Mines	80 mines operating annually
Acreage Disturbed	8,000 acres total mining disturbance (1,000 ac old tailings and 7,000 ac new disturbance)
Acreage Reclaimed	8,000 acres to Alt. A Proposed Action performance standards
Topography	No significant impact
Minerals	No significant impact on development
Soils:	
-Acres of soil disturbed	8,000 acres cumulative disturbance
Water Resources:	
-Channel morphology miles	92 miles total disturbance
-Sediment load tons/day	7,400 tons per day discharge during extreme precipitation events
-Toxic substances	Magnitude unknown, heavy metal and petroleum products
Landcover:	
-Permanently barren from mining	6,105 acres
-Years to regrow to shrub community	30 to 50 years
-Threatened & endangered plants	No significant impact
Wildlife:	
-Acres of habitat subject to disruption/disturbance	227,044 acres due to roads and trails
-Acres of habitat lost for x years	18,000 acres for 30 to 50 years
-Acres of habitat physically altered	19,287 acres total (roads and mined acreage)
-Threatened & endangered animals	No significant impact
Aquatic fauna:	
-Fish populations	Short term impact to local populations
-Miles of stream disturbance	196
Cultural & Paleontological resources	No significant impact
Subsistence	No significant impact
Recreation & visual resources	Reduction in visitor use; however, access to area is improved
Economics: rural	
-Employment (workers)	470
-Earnings ($000,000)	128.9
-Output ($000,000)	295.4

Figure B-1. Summary of Worst Case Scenario.

- The standards for analyzing the Worst-Case are the same as Alternative A in Chapter Four.
- There would be 80 active mines each year.
- Each mine would operate on a block of claims (5 to 20).
- Ten acres would be mined per operation.
- 800 acres would be mined per year in the drainage.
- There would be approximately 8,000 acres disturbed directly by mining activity during the ten year period.
- There would be ten acres reclaimed annually per mine beginning in the second year (800 acres reclaimed in years two through nine and 1,600 acres in year ten) for a total of 8,000 acres.
- Roads and trails would be built to all mines.

Appendix B-3, Methodology for Estimating the Administrative Cost of BLM's Surface Management Program and the Cost for Implementing Alternative D

The Steese/White Mountains District of BLM processed over 100 placer mining applications and inspected about 75 active mines during fiscal year 1987. For administrative cost estimation purposes, the cost of this program for fiscal year 1987 (approximately $175,000) has been divided into two parts, processing mining applications and field compliance, and has been used as the predictive model of the EISs. Considering the number of placer mining plans and notices processed, the amount of monitoring trips, and the compliance inspections completed, it was estimated that placer mining applications cost about $1,000 each to receive, review, and process and about $800 to inspect each active mine. The $1,000 estimate includes the cost of conferring with applicants, onsite inspections, and preparing Environmental Assessments when necessary. The inspection costs include transportation, two monitoring visits, two inspection trips to the mine site, and preparation time for the compliance report. Both costs include between 10 and 15% overhead for management direction and training.

The Proposed Action requires more stringent reclamation performance standards than during 1987, so a 100% increase in the compliance cost was estimated to be necessary to ensure compliance with these strict standards. An increase in BLM compliance cost would be attributed to additional Inspector training and a greater number of compliance inspections. The costs for processing a placer mining application and completing compliance inspections under the Proposed Action would be $1,000 and $1,600, respectively, for a total of $2,600 per mine.

Alternative A would place less emphasis on reclamation standards than during 1987, so it was assumed that the lower reclamation standards would require fewer mine site inspections to ensure compliance and would result in an estimated 50% reduction in cost of compliance. Therefore, the costs for processing a placer mining application and completing compliance inspections under Alternative A would be $1,000 and $400, respectively, for a total of $1,400 per mine.

Alternative B would place greater emphasis on reclamation standards than Alternative A and proposes a greater level of compliance inspection than during 1987 to ensure compliance with

selected Alternative D. The estimated claim values may not include extreme minimum and maximum values that could exist on some claims.

Appendix B-4, State of Alaska Reclamation Requirements

- Topsoil shall be saved and protected from erosion. No topsoil shall be disposed of in natural water bodies. It is suggested that the graded tailings may provide good areas to dispose of topsoil which would encourage natural revegetation.
- Tailings shall be graded at the close of each season to approximate the surrounding ground contours.
- Activities employing wheeled or tracked vehicles shall be conducted in such a manner as to minimize surface damage.
- Existing roads and trails shall be used whenever possible. Trail widths shall be kept to the minimum necessary. Trail surface may be cleared of timber, stumps, and snags. Due care shall be used to avoid excessive scarring or removal of ground vegetative cover.
- All activities shall be conducted in a manner that will minimize disturbance of drainage systems, changing the character, polluting, or silting of streams, lakes, ponds, water holes, seeps, and marshes, or disturbance of fish and wildlife resources. Cuts, fills, and other activities causing any of the above disturbances, if not repaired immediately, are subject to such corrective action as may be required by the Director.
- The Director of the Division of Mining may prohibit the disturbance of vegetation within 300 feet of any waters located in specially designated areas as prescribed in 11 AAC 96.010(2) except at designated stream crossings.
- Every reasonable effort shall be made to prevent, control, or suppress any fire in the operating area. Uncontrolled fires shall be immediately reported.
- Holes, pits, and excavations shall be filled, plugged, or repaired to the satisfaction of the Director of the Division of Mining. Holes, pits and excavations necessary to verify discovery on prospecting sites, mining claims, and mining leasehold locations may be left open but shall be maintained as required by the Director.

(State of Alaska 1988)

Appendix C-1, Geologic Time Scale

GEOLOGIC TIME SCALE			
Era	System or Time Period	Series (rocks) or Epoch (time)	Approximate Age in millions of years (beginning of unit)
Cenozoic	Quaternary	Holocene Pleistocene	0.01 1.7 to 2.0
	Tertiary	Pliocene Miocene Oligocene Eocene Paleocene	5 to 6 25 to 27 37 to 39 53 to 54 63
Mesozoic	Cretaceous Jurassic Triassic		136 to 138 190 to 195 225
Paleozoic	Permian Carboniferous Pennsylvanian Mississippian Devonian Silurian Ordovician Cambrian		270 to 280 345 to 350 395 to 420 440 to 450 ca. 500 ca. 570
Precambrian			

Source: from Principles of Geology. 1975; Gilluly, James [and others]; San Francisco, CA; W.H. Freeman and Company; page 77.

Appendix C-2, Long-Term Camping Program History and Enforcement Considerations

Initiation of the long-term camping program is the result of a study conducted in 1977 by Michael Hudson, "Fortymile River: Biological Aspects of Carrying Capacity." The study conveyed the importance of conducting certain annual routines where increased human use is projected.

In 1978 an active monitoring program was established and has continued each field season. Initially the program consisted of public contact and education, campsite inventories, recordation of river conditions, wildlife, human use and occupancy, photo documentation, and more. Suction dredge mining has been increasing since 1972 and the number of field camps was increasing each year. As public use increased, the number of monitoring trips expanded to one trip per seven to ten-day period commencing on or about June 1 and ending on or about October 1.

each year. As public use increased, the number of monitoring trips expanded to one trip per seven to ten-day period commencing on or about June 1 and ending on or about October 1.

The numbers of camps associated with suction dredge mining on the riverbed continued to increase through 1981 and leveled off in 1984. "To cope with problem(s), the BLM instituted a permit system for long-term campers in 1982. Stipulations required that these campers maintain clean camps during their stay on the river, as well as to thoroughly clean up when they moved on (DOI 1983)." The general area had been closed to federal mineral location since March, 1972. During this period the suction dredgers were staking claims under the Alaska Administrative Code hedging on a determination of navigability. The value of gold drove up the interest in the riverbed claims and effectively increased the human population along the river.

Between December 1980, when ANILCA was passed, and December 1983, the Fortymile River management planning process and the navigability study were being conducted. In October 1983 the Fortymile National Wild and Scenic River Management Plan was approved and submitted to Congress as required by ANILCA.

> "Long-term camping and suction dredge mining were subjected to intense scrutiny throughout the river management planning process. They were accepted as manageable elements in the [river management plan] submitted to Congress. Provisions for management and enforcement are in place and being exercised to meet the objectives of the Wild and Scenic Rivers Act and Fortymile River Management Plan" (DOI 1988c).

Implementation of the long-term camping program commenced on January 23, 1984, when the first "Special Order" was adopted; since then it has been amended to provide special regulations. In March of 1984 correspondence was sent to State riverbed claimants advising them of the Plan Action 6.1 and the special order; application materials and instructions were provided. Up to this point long-term camping was regulated under provisions of Sections 202 and 302 of FLPMA. Since 1984, between ten and twenty permits have been issued for long-term camping each year. Historically, all long-term camping permits have been issued to State mining claimants who suction dredge on State riverbed claims where preferred habitation is on adjacent federally managed lands.

From March of 1984 through 1985, camping permits were authorized under Section 302(b) of the Federal Land Policy and Management Act of 1976 (43 USC 1732, 1740) set forth in 43 CFR 2920.2-2. This authorization and attendant NEPA procedures were found appropriate for the level of use. The use was found to be of minimal impact and categorically excluded from the NEPA process per 40 CFR 1508.4: "Issuance of authorization for temporary use of small sites for field work camps." Permits were issued to each client with a list of special stipulations similar to those currently in use.

BLM was sued in the United States District Court in civil action Case Number A86-083 Civil, February 10, 1986. On April 4, 1986, the BLM agreed to a stipulation concerning long-term camping resulting in a programmatic environmental assessment dated June 6, 1986, prepared pursuant to stipulations D.1 and D.3 of the Civil case. The environmental assessment found the proposed

reviewed pursuant to NEPA on an individual basis through the Environmental Assessment/Land Report process.

On May 28, 1987 the court issued four injunctions in said action. The injunction for the Fortymile Wild & Scenic River watershed, as it pertained to long-term camps, specified the following:

> "Suction dredge mining is expected to continue, and camping on State land, below the mean high-water mark, is a viable alternative for the miner with such use beyond BLM's control. The State DOM is establishing an enforcement program concerning mining activities. While the BLM has conducted highly active "on the ground" use management, enforcement and visitor education programs, the State has limited capabilities and may not be able to administer at the same commitment level if there is an increased use of the shore below the mean high-water line....
>
> "Long-term camping activities are regulated on federal lands with a permit monitoring and compliance program, yet long- term camping is considered casual use by the State and for the most part unregulated. Long-term camping activities conducted below the mean high-water mark would not meet State water quality standards, complement the scenic river classification, nor provide for appropriate human waste and refuse disposal, equipment and fuel storage (Letter from John Bauer, ADEC 1988). ADEC has an office in Tok and cooperatively conducts field monitoring and enforcement routines with the BLM on the Fortymile River system.

Appendix C-3, Visual Resource Management Classes

Visual resource management in the Fortymile National Wild, Scenic, and Recreational River by BLM includes management of the "wild" portions as VRM Class I and the "scenic" portions as VRM Class II. The visual quality objectives are as follows:

VRM Class I: Applies to all areas designated as "wild."

This classification is intended to preserve a natural-appearing landscape essentially unaltered by humans. This class does not preclude very limited management activity; however, the level of change to the characteristic landscape should be very low and must not attract attention.

Past or present activities which have altered or will alter the characteristic landscape generally do not meet the Visual Resource Management objectives for Class I management areas. Placer mining, road construction, permanent campsites, and other similar activities where the soil, water, or vegetation is altered from the natural appearing landscape are not compatible with these objectives.

VRM Class II: This classification concerns the critical viewsheds applying to all areas designated as "scenic" and most areas designated as "recreational."

VRM Class II areas will be managed so that changes in any of the basic elements (form, line, color, texture) caused by management activity should not be evident in the characteristic

landscape. Human alterations to the natural environment may be seen but should not attract attention.

VRM Class III: This classification may include some areas classified as "recreational" as well as other public lands within the Fortymile River watershed.

The objective of Class III is to partially retain the natural landscape. Human alterations to the landscape may attract attention, but should not dominate the view of the casual observer. The overall level of change can be moderate, although still subordinate to the natural landscape.

Appendix C-4, Estimated Riverbed Area and Mining Claims

1) This table is for the navigable river segments only and presents the number of possible State riverbed claims and total estimated acreage of the navigable riverbeds.

2) The acreage estimations were calculated from 1975 color aerial photos measuring several points along each section of river. Distances are estimated and could vary with the scale conversion.

3) The width of the riverbed is determined by the measured width of the bed between the vegetation lines which approximates the ordinary high watermarks on either side of the river.

4) A liberal interpretation of the State requirements for staking claims was used to extrapolate the number of possible claims that could be located on the bed of the navigable segments. The number of claims is not intended to reflect the number of State claims on record, which varies from year to year.

Confluence of Mosquito Fork and Chicken Creek to South Fork Bridge:
width range 117 ft. - 292 ft./average width 214 ft. for 6.9 miles
6.9 miles @ 1,320 ft. = 27.6 claims
estimated acres: 178.98

South Fork Bridge to Confluence of North Fork and South Fork:
width range 175 ft. - 292 ft./average width 226 ft. for 21.9 miles
21.9 miles @ 1,320 ft. = 87.6 claims
estimated acres: 599.93

South Fork/North Fork Confluence to Fortymile River Bridge:
width range 234 ft. - 351 ft./average width 291 ft. for 16.2 miles
16.2 miles @1,320 ft. = 64.8 claims
estimated acres: 571.42

Confluence South Fork/North Fork to Kink:
width range 205 ft. - 351 ft./average width 264 ft. for 21.1 miles
21.1 miles @ 1,320 ft. = 84.4 claims
estimated areas: 675.20

Fortymile River Bridge to Alaska/Canada Border:
width range 205 ft. - 439 ft./average width 280 ft. for 23.0 miles
23.0 miles @ 1,320 ft. = 92.0 claims
estimated acres: 780.61

Estimated Total Claims: 356

Estimated Navigable Riverbed (Acres): 2,806.13

D-1 Landcover Methodology

Analysis of acreages affected by mining and reclamation were based on projected disturbance from mining and associated mining access roads and trails (Figure 4-1).

1. Acreages of historic disturbance were estimated by BLM field inspectors.

2. Figures taken from 1987 APMAs show that approximately 50% of mining disturbance on federal claims in the Birch Creek watershed was on old dredge tailings, and 50% on new, previously unworked ground. This proportion was extended to Fortymile River watershed to calculate the acreage of mining which would be on "new" ground and "old" tailings.

3. Old dredge tailings in Nome Creek (Beaver Creek watershed) are 80-90% barren or sparsely vegetated after 40 years of natural regrowth. A figure of 85% was used to estimate barren acreage for mining activity on old dredge tailings, and 15% for revegetation on old tailings. Dredge tailings are "clean," with a very small percentage of fine materials remaining in the gravel tailings.

4. Mining disturbance on new ground is estimated to result in a 60% vegetation cover after reclamation and regrowth, with 40% remaining barren.

5. Mining disturbance on new ground which is not reclaimed is estimated to result in 75% barren, with a 25% vegetated cover after approximately 40 years. Washplant tailings have a greater proportion of fine-grained materials than dredge tailings.

6. Disturbed areas on dredge tailings would be extensively reclaimed with Alternative C. The addition of fine materials, fertilizer, and possible seeding would increase vegetative cover after regrowth. This level of reclamation is estimated to result in 50% vegetative cover, with 50% remaining barren.

7. Roads are assumed to remain barren, while trails are considered to be changed in vegetative cover and composition, but not rendered barren.

8. Total acreages for each alternative were calculated by adding historic disturbance, projected disturbance with associated regrowth for each alternative, and the contribution from roads or trails. Estimates for acreages for all alternatives are in Figure 4-1.

Appendix E-1, Methodology for Sediment

In 1973, the EPA estimated the various erosion rates from various land uses. While this model is based on nationwide rates and does not specifically represent Alaska, it does provide a set of parameters that can be used as a comparison. This comparison focuses on the relative contribution of ongoing and historic placer operations; proposed future contributions may thereby be placed in perspective.

One of the reasons to use this type of methodology is the issue of data. In theory, it is possible to calculate the sediment that can be put into a stream and predict the amount that will pass by a point downstream. In practice, such a task is difficult, requiring a considerable amount of sediment, hydraulic, and hydrologic data. More specifically, the types of soils, ground cover, slope and aspect, nature of the operation, microclimate precipitation, and a host of other variables suggest that an overall approach be developed for comparative purposes. These data are not available for the enjoined watersheds, except for some limited data on Birch Creek (ADEC 1986). The EIS team developed their own approach using the EPA data, then compared it to the Birch Creek data:

1) EPA (1973) estimated the representative rates of erosion from various land uses in annual tons per square mile to be:

Forest	24
Abandoned surface mines	2,400
Harvested forest	12,000
Active surface mines	48,000
Construction	48,000

2) EPA methodology does not identify the relative contributions to water courses or normal sediment traps.

3) Acreage figures were used from ongoing and projected disturbances and converted to a square mile ratio.

4) Representative rates and areas were multiplied to get suggested comparative rates.

5) Some specific assumptions were made, which in the final analysis means that our projections probably overstate the actual magnitude of the problem. The assumptions include:

a. Forest lands are estimated to be 90% of the basin, and forest cover is defined as all covered ground.

b. No regrowth and regeneration occur on previously disturbed lands.

c. Disturbances continue past 1998 but reclamation will occur at the end of the mining operation.

d. Construction of roads and other development will contribute less sediment on successive years, but this is not calculated here.

6) Figure E-1 is a summary of this evaluation.

7) When compared to Birch Creek (ADEC 1986) the following generalizations can be made:

a. The average estimated sediment load for two undisturbed basins (Boulder Creek - 30.47 square miles and Bedrock Creek - 10.35 square miles) was 0.0010 and 0.0038 tons per square mile, respectively. If these rates are projected to the entire Birch Creek drainage, and figured on a 24-hour day and a 200-day season, the projected sediment rates are 11,234.6 and 42,774.1 tons per day season. This is compared to our hypothetical sediment from forests of 46,224 tons per year.

b. The average estimated sediment load for Birch Creek at the Steese Highway (which includes all mined areas) was 0.014 tons per hour per square mile during the 1985 field season. For projection purposes, all things being equal, using the Dames and Moore (ADEC 1986) study, the BLM would estimate that, based on a 200-day season, about 143,800 tons of sediment would find its way past the bridge monitoring station. The idealized sediment rates were calculated to be 202,820 tons per <u>year</u>. So the BLM estimates, in a very general qualitative way, are within about 30% of the calculated values of the Dames and Moore study.

8) Tons of sediment per year and tons of sediment for an Alaska 200-day season are converted to tons per day.

Category	1987 Annual Tonnage Rate of sediment per square mile	X	Square miles of a category in Fortymile River	=	Annual Tonnage Rate of sediment per category in Fortymile River
Forest	24	X	4,388.00	=	105,300
Abandoned Surface Mines	2,400	X	1.64	=	3,938
Active Surface Mines	48,000	X	0.35	=	16,500
Construction	48,000	X	1.1	=	52,800

Figure E-1. Methodology used to obtain annual tonnage sediment rates for various categories in Fortymile River. Square mile sediment rates taken from EPA.

Appendix E-2, Staking and Operating a Federal Mining Claim

The following paragraphs tell how to locate a federal mining claim and what BLM's requirements are for operation on a claim.

A certain degree of background research is necessary to identify what general area a prospective miner may be interested in. The interested party must identify where, by legal land description, he/she intends to conduct activities. Examination of appropriate maps will aid in the proper identification of BLM lands and, when used in conjunction with the BLM master title (MT) plats found in the public room, will help identify lands open to mineral entry. Proper identification and marking of the prospect on a topographic map to more clearly define the area of interest will aid the proponent in finding the lands of interest in the field.

After determining where the desired location is, the proponent must travel to the actual site and determine if any location markers exist. If not, the claim must be "located" by establishing clearly visible location posts or markers and then recording the claim with the proper authorities, i.e., the State of Alaska's Recording Office and the BLM (of course, a prospective miner can take a chance and not go through the process of claim location, but he/she then runs the risk of having someone else staking (locating and recording) the claim and being legally able to force them off the claim.) Once a claim is properly located and recorded, $100 worth of assessment work must be performed on the claim every year with proof of the work performed filed by December 30th annually with the BLM. If this is not accomplished and the claimant desires to keep his/her claim, he/she must file with the BLM by December 30th annually a Notice of Intent to Hold.

While it is to the advantage of any prospective miner to legally locate and file his/her claim there is no requirement that a miner must do so prior to conducting mining activities.

The filing of a Notice, as per 43 CFR 3809.1-3, is required of any operator (other than casual use operators or recreational miners as described in 43 CFR 3809.1.2) whose facilities disturb 5 or less acres. A Notice filing must include the name and mailing address of the mining claimant and operator, if other than the claimant; when applicable, the name of the mining claim(s); a statement describing the activities proposed and their location in sufficient detail to locate the activities on

the ground; the approximate date of the onset of the activities; a description of the access routes to be constructed; a description of the equipment to be used; a statement that all reclamation of disturbed areas will be accomplished in accordance with 43 CFR 3809.1-3(d); and a statement that reasonable measures will be taken to prevent unnecessary or undue degradation of the federal lands. No recommended format for the Notice exists. (This portion may be under judicial review by the District Court).

The filing and approval of a Plan of Operations, as per 43 CFR 3908.1-4, is required of any operator whose facilities disturb more than 5 acres. A Plan filing must include the above listed information as well as a map, preferably topographic, showing existing or proposed routes of access, aircraft landing areas, or other means of access, and size of each area where surface disturbance will occur; and measures to be taken during extended periods of non-operation to maintain the area in a clean and safe manner and to reclaim the land to avoid erosion and other adverse impacts.

BLM may do the following things to ensure compliance with the reclamation of mining sites: [see other agency permits (Chapter One)]

- Conduct field compliance inspections/monitoring
- Develop reclamation plans with the operator/claimant
- Develop mitigative measures/site specific stipulations
- Require mandatory bonding
- Seek court intervention
  a. Temporary restraining order
  b. Injunction from further activity
- Institute fines or civil penalties
- BLM to perform reclamation ourselves and go to court to recover costs from the operator/claimant.

Appendix E-3, Comparison of Reclamation Requirements and Estimated Costs

Reclamation Requirements				
Proposed Action	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
Grade tails, spread soils over reshaped tailings, reseed and/or fertilize, re-establish stream channel	Grade tails, stabilize soils, stabilize streams,	Grade tails, spread soils over reshaped tailings, stabilize stream bypass	Grade tails, spread soils over reshaped tailings, reseed and/or fertilize, re-establish stream channel	No mining; pre-1981 unreclaimed; post 1981 to follow Alt. A standards
Cost Per Acre in 1987 Dollars				
Proposed Action	**Alternative A**	**Alternative B**	**Alternative C**	**Alternative D**
$500-tailings $500-soils $250-fertilizer $100-seed $350-stream	$500-tailings	$500-tailings $500-soils	$500-tailings $500-soils $250-fertilizer $100-seed $350-stream	$500-tailings
$1,700 total	$500 total	$1,000 total	$1,700 total	$500 total

Figure E-2. Comparison of reclamation requirements and estimated costs. Sources: Reclamation Research Plans for Alaska National Park System Units, 1986; Alaska Department of Natural Resources, Division of Mining; Bureau of Land Management estimates.

Appendix E-4, Suction Dredging - Sediment Loading Model

Comparison of Suction Dredging to Upland Mining

There are distinct differences between suction dredging operations and upland placer mines and how they contribute to sediment loading.

1) Riverbed material processed by suction dredges differs significantly from the composition of material processed by upland placer mines.

2) Suction dredges discharge processed material directly into the live stream, while waste water treatment methods such as settling ponds are used by the upland mines.

3) The volume of material processed by suction dredging is significantly less than the volume processed by upland placer mines. Most suction dredges process less than 20 cubic yards of material per day. Upland mines process on average of approximately 200 cubic yards per day in the Fortymile (Sisk, pers. comm. 1988).

4) Properly conducted suction dredging operations do not strip organic material and other overburden. Sediment loading occurs during actual dredging when the machine is in operation. Any residual effect from the tailings is minimal and is not visually perceptible.

5) Water quality is impacted only during actual dredging. Turbidity and sediment levels typically return to normal background levels between 25 and 100 feet downstream of the operation.

Assumptions

A wide range of variables arise when preparing estimates for predicting the amount of sediment contribution on a daily or annual tonnage rate by suction dredge operations.

The following assumptions were used to determine the annual tonnage rate of sediment contribution to the Fortymile River by suction dredging activities:

1) Operating time:

Daily/Each Dredge

Recreational Dredging:	2-4 hours	3 hours average
Income Dredging:	5-9 hours	7 hours average

Annual/Each Dredge

Recreational Dredging:	10-30 days	20 days average
Income Dredging:	60-90 days	75 days average

Note: Actual operating times are not available; most operators do not record the information. The time estimates noted above reflect discussions with operators.

2) Suction Dredge Sizes and Numbers, 1987:

Dredge size	Number Operating	Under LTC Permit
3"	5	0
6"	6	3
8"	16	10
10"	5	5
12"	2	2
Total Dredges Counted:	34	21

3) The maximum amount of material processed is assumed to be 20 cubic yards per day (7 hours) for a 12-inch suction dredge. Mines processing less than 20 cubic yards of material a day are subcategorized by EPA as non-commercial. The operations are noted as small mines, a classification which also includes recreational and assessment mines.

4) The tonnage rate of unclassified river run material is set at 1.9575 tons per cubic yard for this model. Unclassified river run material weighs between 140 (1.89 tons) and 145 (1.9575 tons) pounds per cubic foot of material. The weight per ton is used for preparing material estimates for industrial use.

5) The sand/silt percentage is set at 7.5% of the processed material and represents the sediment load contribution for this model. Material larger than the dredge intake is moved aside or avoided by the operator. Twenty cubic yards per day is 39.15 tons of unclassified river run material. The sand/silt (sediment) contribution would be 2.94 tons at 7.5% of the total tonnage processed.

Conclusion

The annual tonnage contribution of sediment to the Fortymile drainage by suction dredging is estimated to be less than 3,500 tons per year (3,500/1.9575 =1,788 cubic yards). Water quality is impacted only during actual dredging. The impact is contributed by the content of colluvium and organic material (suspended sediment) being processed. Suspended sediment is estimated to be less than 50% of the 3,500 tons as presented above. The effects of sedimentation and turbidity are localized near the dredge.

The sand (settleable solids) generally precipitate within 50 feet downstream of the discharge point. The distance is dependent on the velocity, volume, and depth of the water below the discharge point. Sand is generally redistributed with larger material upon discharge and a small amount of sand is localized downstream of the dredge operation. An increase in the amount of sand on the riverbed surface Is expected. The redistribution of the sand may contribute to a downstream cumulative effect.

The annual tonnage rate of suspended sediments (silt) is estimated at 1,663 tons (50% of 3,500 = 1,663). Turbid waters containing suspended sediment from dredging are mixed with the surrounding water column and are undetectable beyond the mixing zone. The active mixing zone varies in distance behind the suction dredge and is dependent on numerous factors such as water volume, velocity, and proximity to side streams and riffles.

DEC water quality data suggest suction dredging does not contribute to water quality deterioration in the watershed. No cumulative impact to the water quality is supported by the data. No water quality standards violations for turbidity have been detected through the State's Ambient Water Monitoring Program for turbidity (Bauer 1988) as a result of suction dredging activities.

Appendix F-1, Regulatory Program of the U.S. Army Corps of Engineers, Alaska District

The U.S. Army Corps of Engineers (Corps) Is the federal permitting agency for work proposed in waters and wetlands. Within the State of Alaska, this program is administered by the U.S. Army Engineer District, Alaska.

As its primary regulatory responsibilities, the Corps has jurisdiction over the construction of any structure in or over navigable or tidally influenced waters, the excavation of material from navigable waters, the obstruction or alteration of navigable waters, and the placement of dredged or fill material into waters of the United States, including wetlands.

Work proposed in navigable waters of the United States is subject to Section 10 of the Rivers and Harbors Act of 1899. This Act requires a Department of the Army (DA) permit be obtained prior to performance of any construction or activity that alters the course, current, condition, or navigable capacity of a navigable water.

Work proposed in waters of the United States is subject to the Clean Water Act. Section 301 of the Act requires that a DA permit be obtained prior to the placement of dredged or fill material into waters, including wetlands. Permit specifications are identified in Section 404.

Within the Fortymile River drainage, no navigable waters subject to Section 10 of the Rivers and Harbors Act of 1899 are present. However, extensive areas subject to Section 404 of the Clean Water Act are present. The regulations implementing the Corps permit program are found at 33 CFR 320 et seq. As identified in the regulations the Corps mandate is to consider the public interest when determining whether proposed work should be authorized. No work shall be permitted unless it is found to be in the public interest. Further, waters of the United States and a regulated activity are not restricted by land ownership. A Corps permit may be required for work proposed on private land as well as for work proposed on public land.

If a proposed project is located in an area subject to Corps jurisdiction and requires issuance of a permit, a formal application must be submitted. A public notice describing the proposed work would be prepared and issued to other federal, State, and local agencies and to members of the public for review and comment. If the project is controversial, a public hearing may also be held. In addition to review of the proposed project by other agencies and individuals, the Corps conducts its own public interest review.

The decision whether to issue a permit will be based on an evaluation of the probable impacts, including the cumulative impacts, of the proposed activity and its intended use on the public interest. The benefits which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal must be considered including the cumulative effects thereof. Among the factors considered are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, land use, navigation, safety, and the needs and welfare of the people among others.

As a result of the public interest review, proposed work may be authorized, denied, or issued with special conditions. Additionally, an applicant may be requested to modify potentially detrimental aspects of the proposed work to comply with the intent of the Clean Water Act or to other laws that apply to the review process. A schematic presentation of the Corps permit application review process is shown in Figure F-1.

In addition to issuance of individual permits, proposed work may also be Issued by existing Nationwide permits found in the Corps regulations, by General Permit (GP), or by Abbreviated Processing Procedures (APP). In its review of proposed placer mining work, the Alaska District is presently identifying those projects not subject to Corps authority, those projects subject to Corps authority and authorized under Nationwide Permit, and those projects suitable for review under individual permit application review procedures. A GP for placer mining is also being considered and may be in use by late spring, 1988. In addition, an APP is being developed but is not anticipated to be In effect for the 1988 mining season. Once in place, however, those projects meeting the terms and conditions of either procedure could receive expedited processing.

Though not consldered to be an Inclusive list, many of the activities associated with placer mining subject to Corps authority are identified below. Additional information on work subject to Corps authority may be found in the Corps regulations.

For the Corps, preparation of BLM's EISs will provide analysis and documentation from which future Corps authorization of work proposed in the areas subject to the EIS would be tiered. Under individual permit application review procedures, project specific environmental assessments may be tiered from each EIS. In addition to the analysis and discussion of anticipated impacts contained in each EIS, the particular circumstances of each project, including analysis of site-specific impacts, would be included in the environmental assessment prepared for each project. Second, development of GPs for work proposed in areas subject to EIS preparation could be tiered from each EIS. Third, APP could be tiered from the subject EISs.

For projects being reviewed under individual permit application review procedures or under APP, the Corps will also evaluate each project under the Section 404(b)(1) Guidelines prepared jointly by the Corps and the EPA (40 CFR Part 230). In addition to determining whether the proposed work meets standards established by the Guidelines, the Section 404(b)(1) analysis includes a review of project alternatives in an effort to avoid or minimize anticipated adverse impacts to aquatic values. For works authorized under a GP, a Section 404(b)(1) analysis would be prepared for all work anticipated to be authorized under each GP. Section 404(b)(1) analysis of each project would not be prepared.

The Corps Regulatory Branch will assist any individual, agency, company, or corporation in determining whether Issuance of a permit for proposed work is required. More detailed information concerning the Corps regulatory program, Including information concerning the regulation of activities associated with placer mining, may be obtained by writing to the Corps at the following address:

Regulatory Branch
Alaska District
U.S. Army Corps of Engineers
P.O. Box 898
Anchorage, Alaska 99506-0898
or by telephoning (907) 753-2712 or toll free at (800) 478-2712.

Activities Subject to Section 404 of the Clean Water Act

The following activities associated with placer mining are subject to Section 404 of the Clean Water Act when performed in waters of the United States, including wetlands:

1. the stockpiling of overburden;

2. the stockpiling of placer bearing material prior to processing;

3. the placement of dredged and/or fill material associated with work such as stream diversions, reservoirs, impoundments, and fish bypass channels; and dams, dikes, and berms related to water diversion, collection, and/or retention;

4. the placement of dredged and/or fill material associated with construction of roads, i.e., roads accessing the mine as well as roads located within the mined area(s). NOTE: Nationwide Permit Number 14 may apply for minor stream crossings;

5. the placement of dredged and/or fill material associated with the construction of settling basins, including the construction of access roads, berms, dikes, and similar works;

6. the placement of dredged and/or fill material associated with the excavation of bedrock drains, drainage ditches, and similar works;

7. the placement of dredged and/or fill material associated with the construction of buildings, staging areas, equipment facilities, airstrips, and similar works; and

8. the placement of dredged and/or fill material associated with reclamation.

Activities Subject to Section 10 of the Rivers and Harbors Act of 1899

The following activities associated with placer mining are subject to Section 10 of the Rivers and Harbors Act of 1899 when performed in navigable waters of the United States:

1. all activities listed under work subject to Section 404 of the Clean Water Act above;

2. dredging; and

3. any other activity in, on, or over a navigable water that could affect the course, current, condition, or navigable capacity of a navigable water.

Typical Corps permit review process

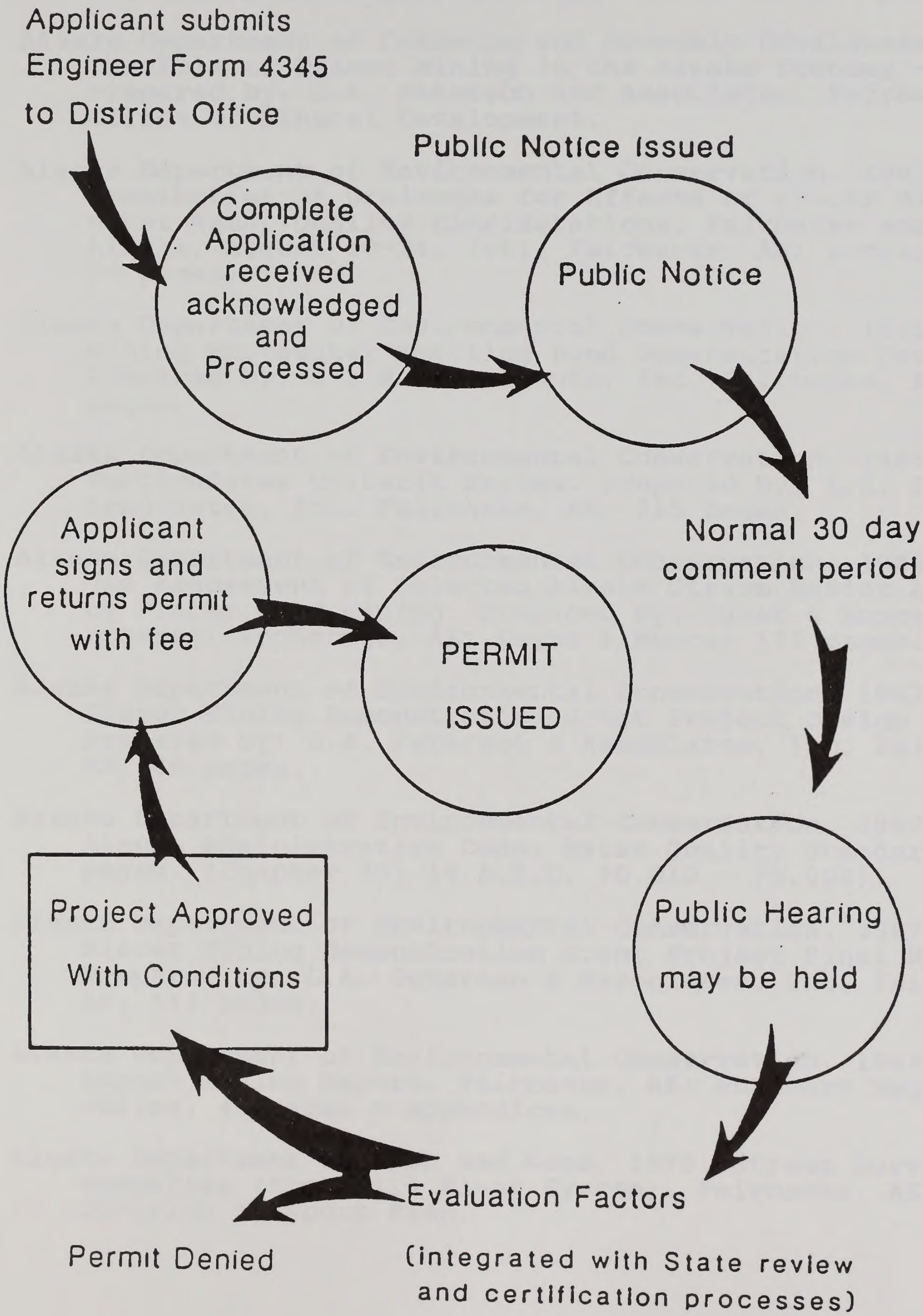


Figure F-1. Permit Review Process.

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Glossary

Active Mining Claim: A current BLM mining claim in which all assessment and other requirements have been met, although no active mining may be taking place.

Alevius: A newly hatched salmon with yolk sac still attached.

Allochthonous: Formed elsewhere and transported from a distance.

Alluvial Fan: A low, outspread mass of loose rock material shaped like an open fan deposited by a stream at the place where it issues.

Alluvium: Deposits laid down by modern rivers and streams.

Anadromous: Aquatic organism migrating from marine waters to freshwater to spawn.

Alteration Zone: An area being modified or changed in any noticeable way.

Aquifer: A body of rock that is sufficiently permeable to convey ground water and to yield economically significant quantities of water to wells and springs.

Areal: A multi-leveled or spatial relationship between two or more resources.

Aspect: A particular status or phase in which something appears or may be regarded.

Association: In an abstract sense, a group of communities or stands that are classified together because they meet certain standards of similarity.

ATV: All-Terrain Vehicle. A three- or four-wheeled vehicle equipped with low pressure tires, and with a seat straddled by the rider.

Aufeis: An ice feature formed by water overflowing onto a surface, such as river ice or gravel deposits, and freezing.

Batholith: A large plutonic mass that has more than 40 square miles of surface exposure and no known floor.

Benthic: Relating to or occurring at the bottom of a water body.

Biomass: Amount of living matter as in a unit area or volume of matter.

Biotite: A general term to designate all iron and magnesium- bearing micas.

Braided Stream: A stream flowing in several dividing and reuniting channels resembling the strands of a braid. Typically within a wide floodplain.

Bryophytes: Non-flowering plants comprising the mosses and liverworts.

Burin: A steel tool with an oblique point and rounded handle for carving stone, or a prehistoric chisel-like flint tool.

Candidate Species: Those species (plant or animal) included in the Federal Register "Notice of Review" listing that are being considered by the FWS for listing as threatened or endangered species.

Chaining: Use of a cultivating implement to spread and distribute debris; usually devised of link chains.

Channelize: A non-natural rerouting of a stream course.

Cirque: A deep, steep-walled, half-bowl-like recess situated high on the side of a mountain and commonly at the head of a glacial valley and produced by the erosive activity of a mountain glacier.

Classification: Separation of materials by size.

Clay: Sediment particles less than 0.002 mm in equivalent spherical diameter.

Climax: A more or less stable biotic community which is in equilibrium with existing environmental conditions and which represents the terminal stage of an ecological succession.

Coagulation: A chemical process that reduces turbidity in a water body.

Code of Federal Regulations (CFR): Regulations promulgated and enforced by federal agencies which have the full force of law.

Coliforms: Relating to, resembling, or being a bacilli that resides in vertebrate intestines.

Colluvial: Soil material, rock fragments, or both, which have been deposited at the base of a steep slope by creep, slide, or local wash.

Comminute: To reduce to minute particles or pulverize.

Community: Any group of organisms belonging to a number of different species that co-occur in the same habitat or area and interact through trophic and spatial relationships, typically characterized by reference to one or more dominant species.

Critical Viewsheds: That portion of the viewshed in which the condition of the landscape is a major factor in determining the type of experience available to visitors.

Crown Fire: A fire that burns mainly the top foliage of trees or shrubs.

Crucial Habitat/Crucial Use Area: Wildlife use area(s) which are necessary for perpetuation of the species or population and which provide an essential element of the life cycle for that species or population.

Crustose: Having a thin thallus, adhering closely to a substratum of rock, bark, or soils.

Cryofibrist: An organic soil material (peat) formed under cold conditions.

Cryogenic: A soil formed under cold conditions, literally "cold genesis."

Cumulative Effects or Impacts: The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

D2: Refers to Section 17(d)2 of the Alaska Native Claims Settlement Act.

Deciduous: To fall off or shed annually, seasonally, or at a certain stage in the life cycle.

Dendritic: A stream pattern characterized by irregular branching in all directions.

Detritus: Material released by weathering processes and subsequently transported and deposited as sediments.

Dike: A tabular igneous intrusion that cuts across the structure of the surrounding rock.

Disclimax: An ecological succession maintained below climax by climatic instability, fire, grazing, or by human activities.

Ecosystem: The Community including all the component organisms together with the abiotic environment, forming an interacting system, e.g., a marsh.

Ecotone: The boundary or transitional zone between adjacent communities or biomes.

Endangered species: Any species which is in danger of extinction throughout all or a significant portion of its range due to current or planned activity. (The Endangered Species Act - Amendments of 1982).

Endemic: Native to or restricted to a particular type of habitat, locality, or region.

Environmental Assessment: This document is prepared for actions not exempt from NEPA, not categorically excluded, not adequately covered in an existing RMP/EIS or other environmental analysis, and not normally or obviously requiring an EIS.

Ericaceous: Refers to the heath family of plants. Heaths are dwarf woody shrubs, including such species as blueberries, cranberries, mossberries, etc.

Federal Land Policy and Management Act (FLPMA): BLM's "organic act" which serves as the basic law providing direction for lands and minerals management under its jurisdiction.

Federal Register: A publication system used to inform the public of Federal regulations, proposed regulations, and to provide for the publication of agency statements of organization, procedural rules, and general policy.

Felsic: An igneous rock containing light minerals such as quartz, feldspars, feldspathoids and muscovite.

Fingerling: A fish up to one year of age; between the fry and smolt stage.

Fines: The smaller-grained particles of soil or gravel, usually consisting of fine sand, silt, and clay.

Flaggy: A soil characterized by coarse rock fragments that are flat, thin, and angular, with dimensions of six to 15 inches.

Flocculation: A chemical process that causes clay particles to stick together, making them settle out faster and reduce turbidity.

Fluvial: Produced by river or other stream action.

Foliose Lichens: Lichens having a flat, thin, and usually lobed thallos attached to a foundation.

Forb: Any herbaceous plant which is not a grass or sedge.

43 CFR 3809: Regulations which set forth policies and procedures providing for mineral entry, exploration, location, operations and purchase pursuant to the mining laws in a manner that will not unduly hinder such activities, but will assure that these activities are conducted in a manner that will prevent unnecessary or undue degradation and provide protection of non- mineral resources of the Federal lands.

404 Permit: The 404 guidelines are the substantive criteria used in evaluating discharge of dredged or fill material under Section 404 of the Clean Water Act.

Freshet: A great rise or overflowing of a stream due to heavy rains or melting snow.

Frost Boil: A small area of upward movement of soil or inorganic material caused by the freezing and thawing of free water in the soil.

Fruiticose: Lichen growth form which is branched, more or less shrub-like.

Fry: A recently hatched fish that has used up the yolk sac, and has emerged from gravel and is ready to feed.

Gel Log: A chemical treatment that settles out suspended solids from effluent water before releasing it into a stream.

General Mining Law of 1872: Provides for exploration, development, production, and purchase of mineral resources of the public lands, as well as the implied right of statutory access to mining claims.

Giardia: Infestation or disease caused by a flagellate protozoan.

Graminoid: Refers to an herb with long, narrow leaves, i.e., grasses and sedges.

Gravimetric: Analysis which pertains to a measurement by weight.

Harrow: A cultivating implement with spikes, spring teeth, or discs, and used primarily for smoothing and distributing soil.

Herb: A plant with one or more stems that die back to the ground each year; grasses and forbs as distinct from shrubs and trees.

High Water Mark: The line which the water impresses on the soil by covering it for sufficient periods of time to deprive it of vegetation.

Hydrology: The study of the origin, distribution, and properties of water on or near the surface of the earth.

Hydrostatic Pressure: Pressure exerted or transmitted by fluids at rest.

Ice Wedge: Wedge-shaped ground ice produced in permafrost, occurring as a sheet, dike, or vein tapering downward. It originates as the growth of frost or by the freezing of water in a narrow crack or fissure.

Invasion: The migration and establishment of an organism in a new location.

Karst: An irregular limestone region with sinks, underground streams, and caverns.

Lacustrine: Pertaining to, produced by, or formed in a lake or lakes.

Launder: a trough, channel, gutter, flume, or chute by which water or powdered ore is conveyed in a mining operation.

Legume: A plant belonging to the pea family (Leguminosae).

Lithic: A sedimentary rock containing abundant fragments of previously formed rocks; also said of such fragments.

Loam: Soil material that is seven to 27% clay particles, 26 to 50% silt particles and less than 52% sand particles.

Lode: A vein containing important quantities of metallic ore and filling a well-defined fissure in the rock.

Low Water Mark: The point to which a river or other body of water recedes, under ordinary conditions, at its lowest stage.

Mafic: Igneous rock composed chiefly of one or more dark iron and magnesium-bearing minerals.

Management Framework Plan: A planning decision document prepared before the effective date of regulations implementing land use planning provisions of FLPMA which provides interim management until replaced by the RMP.

Massif: A principal mountain mass.

Management Goal: Goals that have been developed through the planning processes of BLM and other agencies for the watersheds being considered.

Master Title Plats: Maps displaying status of lands managed by the federal government.

Megafauna: Living or fossil animals large enough to be seen with the naked eye.

Metasedimentary: Sediment or sedimentary rock that shows evidence of being subjected to physical and chemical conditions below the earth's surface.

Mineral Soil: Soil composed mainly of inorganic materials and with only a relatively low amount of organic material.

Mining Technique: Methods used by miners to operate their mine. This includes activities such as exploration, access, development, mineral extraction, and reclamation.

Moraine: A mound, ridge or other distinct accumulation of glacial drift deposited chiefly by direct action of glacial ice.

Morphology: A branch of biology or paleontology that deals with the form and structure of animals and plants, or their fossil remains.

National Environmental Policy Act (NEPA): This Act establishes a national policy for the protection and enhancement of the environment. Federal agencies are directed to develop methods and procedures that ensure the unquantified environmental values are given appropriate consideration in decisionmaking as are economic and technical considerations.

National Recreation Area: A federally managed area which involves the protection, regulated use, and development of public lands for recreational enjoyment.

Native: Indigenous; living naturally within a given area; used to describe a plant species that occurs at least partly in natural habitats and is consistently associated with certain other species in these habitats.

Navigable Waters of the United States - (Corps definition): Navigable waters of the United States are those waters that are subject to the ebb and flow of the tide and/or are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. A determination of navigability, once made, applies laterally over the entire surface of the waterbody, and is not extinguished by later actions or events which impede or destroy navigable capacity (33 CFR 329.4).

Non-Point Source: All turbidity, suspended sediment, and sedimentation resulting from soil erosion caused by human activity and emanating from a widespread area.

Notice: A Notice must be filed by all mining operators whose operations, including access across federal lands to their claim, cause a cumulative surface disturbance of five acres or less during any calendar year.

Notice of Intent: A public notice stating that an environmental impact statement will be prepared and considered.

Orographic: Relating to mountains, ie., precipitation caused by uplift of an air mass over a mountain range.

Oxbow Lakes: Remaining lakes that were once a part of a river channel, but are now isolated from the main stream. Most resemble a bent or U-shaped configuration.

Peltic: 1) Pertaining to or characteristic of pelite, a sedimentary rock composed of clay and minute particles of quartz. 2) A metamorphic rock derived from a pelite.

Physiography: Relating to the form of the earth or its surface features, e.g. topography.

Peraluminous: A type of igneous rock in which the molecular proportion of alumina exceeds that of soda, potash, and lime combined.

Performance Standards: A measurable quantity used to define the limits of allowable environmental impacts resulting from mining and related activities.

pH: The hydrogen-ion activity of a solution, which is an indication of the solution's acidity or basicity.

Physiography: Relating to the form of the earth or its surface features, e.g., topography.

Piezometric Surface: An imaginary surface representing the total head of ground water and defined by the level to which water will rise in a well. The water table is a particular potentiometric surface.

Plan of Operations: This plan is required for mining operations disturbing five surface acres or more, and any operation except casual use in areas designated for potential addition to, or an actual part of the Wild and Scenic Rivers System, and designated areas of Critical Environment Concern, the National Wilderness Preservation System administered by BLM, and areas closed to off- road vehicle use.

Pluton: An igneous intrusion or rock mass formed within surrounding rock of another type.

Primary Succession: Succession beginning on a bare area, not previously occupied by plants or animals.

Propagule: Any part of an organism, produced sexually or asexually, that is capable of giving rise to a new individual.

Proposed Action: Any resource use or development or management action proposed by the Bureau, or to the Bureau by a member of the public, or by another agency through any appropriately developed procedures including, in the case of non-Bureau proposals, nominations, petitions, and applications.

Record of Decision: A brief statement which completes the associated EIS and, among other things, indicates which alternative, or combination of alternatives has been approved.

Recorded: The filing of paperwork with the State and BLM to make a mining claim property of record.

Resource Management Plan: A land use plan as prescribed by the Federal Land Policy and Management Act which establishes: 1) the level and intensity of land use, 2) allowable resource uses and related levels of production or use, 3) resource condition goals and objectives, 4) program constraints and general management practices needed to achieve the above, 5) the need for an area to be covered by more detailed and specific plans, 6) support action to achieve the above, 7) general implementation sequences, and 8) intervals and standards for monitoring and evaluating the plan. It is not a final implementation decision on actions which require further specific plans, process steps, or decisions under specific provisions of law and regulations.

Riparian: Refers to land bordering a stream, lake, or tidewater.

Scarify: See harrow or chaining.

Scoping: The act of holding organized meetings to address significant issues that are of particular concern to individuals or groups.

Section 810: Section within ANILCA mandating that subsistence uses and needs are to be considered in federal land use decisions.

Sedge: A rush-like or grass-like plant that grows in wet places.

Sere: The series of stages that follow one another in an ecologic succession.

Serotinous: Refers to late opening, such as cones of black spruce trees which remain on the trees for several years without opening. Allows cones to survive fires, and provide seed source after fire.

Settling Pond: A pond, usually artificially constructed of tailings, designed to remove sediment from water by simple settling.

Settleable Solids: The volume of matter in water that will settle in one hour under quiescent conditions in an Imhoff cone.

Shore: "The space between the margin of the water at its lowest stage (low-water mark) and the banks, at high-water mark." Alabama v. Georgia, 64 US 505(1859).

Shoreland: "Land belonging to the State which is covered by non- tidal water that is navigable under the laws of the United States up to the Ordinary High Water Mark as modified by accretion, erosion, or reliction;" Alaska Public Lands Statute, Sec. 38.05.965(18).

Sierra Club Lawsuit: The series of orders and injunctions arising from the Sierra Club's action that resulted in this EIS.

Significance: A high degree of importance as indicated by either quantitative measurements or qualitative judgments. Significant Issues and impacts require explicit consideration in preparing a plan. Significance may be determined by evaluating characteristics pertaining to location, extent, consequences, and duration. As used in the National Environmental Policy Act, "significance" requires consideration of both context and intensity. (see 40 CFR 1508.17).

Significant Restriction to Subsistence Uses and Needs: BLM policy states that a "significant restriction to subsistence uses and needs" could occur if there is: 1) a reduction in harvestable resources used for subsistence purposes, 2) there is a reduction in the availability of resources caused by an alteration in their distribution, migration, or location, or 3) a limitation on the access of subsistence users to harvestable resources. Generally, only the prediction of large or substan-

tial effects as opposed to slight effects in one or more of these three categories would result in a section 810 evaluation of significant restriction to subsistence uses and needs.

Sill: A tabular igneous intrusion that parallels the structure of the surrounding rock.

Silt: Sediment particles between 0.004 and 0.0625 mm in equivalent spherical diameter.

Skarn: An old Swedish mining term for silicate waste rock with certain iron-ore and sulfide deposits.

Sluice: To mine or wash with water. Also used synonomously with sluicebox.

Sluicebox: The rectangular shaped launder, containing riffles, that is used as a gold recovery system in placer mining.

Solifluction Lobe: A mass of soil material which, because of water saturation, has formed a small terrace through the slow, mass movement of the soil blanket downslope.

Special Area: Those geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important or easily disrupted ecological values.

Stock: An igneous intrusion that is smaller than a batholith and more or less circular in shape.

Stone Stripe: A form of patterned ground consisting of a line of rocks or other inorganic material parallel to the slope of the ground, caused by the freeze - thaw cycle and the effects of gravity.

Stratigraphy: The science of the arrangement of rock strata.

Stream Bypass: A channel constructed to divert an active stream channel around a mining operation, so to avoid direct stream contact.

Strike-slip Fault: A fault on which the movement is parallel to the fault's strike.

Subsistence Uses: Section 803 of ANILCA defines the term "subsistence uses" to mean "...the customary and traditional uses by rural Alaskan residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible by-products of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade." For the purposes of this definition, 1) "family" means all persons related by blood, marriage, or adoption, or any person living within the household on a permanent basis; and 2) "barter" means the exchange of fish or wildlife or their parts, taken for subsistence uses - (a) for other fish or game or their parts; or (b) for other food or for nonedible items other than money if the exchange is of a limited and noncommercial nature.

Succession: The replacement of one kind of community by another kind; the progressive changes in vegetation and in animal life which may culminate in the climax.

Sucker: In many plants, a shoot arising from the lower parts of the stem or from the root.

Suite: A collection of rock specimens from a single area, generally representing related igneous rocks.

Taiga: A swampy area of coniferous forest.

Tailings: Waste material processed through a placer operation usually consisting of coarse sand and larger particles.

Taxonomic: The study of the general principles of orderly scientific classification, usually according to their presumed natural characteristics.

Terrane: A rock or group of rocks and the area in which they crop out.

Thalweg: A line connecting the lowest or deepest parts of a streambed or valley, whether under water or not. If it contains water, it concentrates the main flow.

Threatened Species: Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (The Endangered Species Act - Amendments of 1982).

Thrust Fault: A fault with a dip of 45° or less over much of its extent, on which the hanging wall appears to have moved upward relative to the footwall. Horizontal compression rather than vertical displacement is its characteristic feature.

Tiering: An interrelationship in which reference to a more general NEPA document such as an EIS can be made by a more specific one, thus avoiding duplication. Designed to focus on the actual issues ripe for decision at each level of environmental review.

Topsoil: The upper soil layer or layers containing some organic matter.

Tailrace: A channel in which mine tailings are carried away.

Tundra: The treeless land in arctic and alpine regions, varying from bare area to various types of vegetation consisting of grasses, sedges, forbs, dwarf shrubs, mosses, and lichens.

Turbidity: The condition of a body of water that contains suspended material such as clay or silt particles, dead organisms or their parts, or small living plants and animals.

Tussock: A dense, heavy tuft or matted growth of grass or sedge which forms a small hillock.

Type: A kind of vegetation, e.g., community-type, forest type, birch type.

Unnecessary or Undue Degradation: This is surface disturbance greater than what would normally result under a prudent operator in usual, customary, and proficient operations of similar character. Effects of operations on other resources and land uses, including resources and uses outside the area of operations are also considered.

Vegetation Type: A kind of vegetation or the kind of community of any size, rank, or stage of succession.

Vegetative Reproduction: Reproduction by asexual processes.

Viewshed: The landscape that can be directly seen under favorable atmospheric conditions from a viewpoint or along a transportation corridor, such as a wild or scenic river.

Visual Resource Management (VRM): The inventory and planning actions taken to identify visual values and to establish objectives for managing those values.

Visual Resource Management (VRM) Classes: Categories assigned to public lands which prescribe the amount of change desirable in the characteristic landscape. There are four classes, which from I to IV, allow progressively more human alterations to the landscape. See Appendix C-3 for additional explanation.

Volatile Organics: Carbon-based matter that is highly vulnerable to disruption.

Watershed: A region or area bounded peripherally by water, parting and draining ultimately to a particular watercourse or body of water.

Wetland: 1) An area of low-lying land, submerged or inundated periodically by fresh or saline water. 2) Wetlands have been defined by the COE in 33 CFR 323 as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

Wild River: Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive, and waters unpolluted.

Windlass: A device for hauling or hoisting.

Zero Discharge: A condition where there is no effluent discharge from a mining operation.

Acronyms

ACEC........Area of Critical Environmental Concern

ADGGS.....Alaska Department of Geological and Geophysical Surveys

ADFG........Alaska Department of Fish and Game

ADNR........Alaska Department of Natural Resources

AHC...........Arctic Hydrologic Consultants

AHRS........Alaska Heritage Resources Survey

ANILCA....Alaska National Interest Lands Conservation Act

ATV..........All-Terrain Vehicle

BLM..........Bureau of Land Management

CEQ..........Council on Environmental Quality

CFR...........Code of Federal Regulations

CFS...........Cubic Feet per Second

DEC..........Department of Environmental Conservation (Alaska)

DOA..........Department of Agriculture

DOI............Department of Interior

EIS.............Environmental Impact Statement

EPA...........Environmental Protection Agency

FLPMA.....Federal Land Policy and Management Act

ml/l............Milliliters per liter

NEPA........National Environmental Policy Act

NOI............Notice of Intent

NPDES.......National Pollutant Discharge Elimination System

NTU.............Nephelometric Turbidity Units

NWR.............National Wild River

RMIS...........Recreation Management Information System

RMP............Resource Management Plan

ROD............Record of Decision

SHPO.........State Historic Preservation Officer

SRMA.........Special Recreation Management Area

SS...............Settleable Solids

TSS.............Total Suspended Solids

U.S.C..........United States Code

USGS..........United States Geological Survey

VRM............Visual Resource Management

WRC...........Water Resources Council

WRM..........Wild River Mile

WSRA........Wild and Scenic River Act

WSRS........Wild and Scenic River System

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